MODERN PLASTICS

FEBRUARY 1951

It pays to use your custom molder's know-how

When "high-cost" products need popular price tags

Lower cost, broader market results from use of plastics for humidifier components.

No. 25
in a Series on Plastics Skill at Work . . .

MOLDED OF DUREZ PHENOLIC, the motor hood and mount are unaffected by water vapor that surrounds them or heat generated by the motor they enclose. They are formed to exact shape in molding press, need no finishing other than simple flashing.

PROJECT: All-purpose automatic humidifier to sell at moderate price.

CUSTOMER: Daffin Manufacturing Company, Lancaster, Pa.

MOLDER: American Insulator Corporation

MATERIAL: All plastics except motor. Center pan, motor mount and hood, Durez phenolics.

CENTER PAN SUPPORTS MOTOR and housing on screw inserts fixed in position as part of the molding operation. By using Durez, the molder fulfilled his customer's specifications at a fraction of the cost that other materials would have entailed.

This humidifier shows how "high-cost" ideas are made financially practical for wider use . . . and wider sale . . . with the aid of men who mold Durez plastics.

The Model 500 is a small counterpart of Daffin industrial humidifiers. To make humidification economical for hatchery and farm use, in egg storage rooms, cold storage rooms, chemical plants, textile mills, hospitals, and in the home, this company developed a small motorized unit which evaporates over 3 pounds of water per hour at a current cost of 3 cents a day.

With engineering details completed, the problem was put up to the custom molder. The molder recommended a Durez phenolic especially developed to withstand the heat and moisture encountered in humidifiers. It has excellent molding qualities and dimensional stability, and is formed into complicated parts at a fraction of the cost of the usual metals. Meeting all electrical and mechanical specifications, Durez made it possible to price the unit for ready sale in markets previously closed on the score of high cost.

Your molder is always a good man to consult when better appearance, faster production, or lower cost are your objectives. He takes full advantage of the able counsel of Durez technicians, who specialize in the most versatile group of plastics, the phenolics. Call on him . . . and them . . . freely.

Our monthly "Durez Plastics News" will keep you informed on industry's uses of Durez. Ask us to send a copy regularly. Durez Plastics & Chemicals, Inc., 1202 Walck Road, North Tonawanda, N. Y.

DUREZ

PHENOLIC RESINS

- MOLDING COMPOUNDS
- INDUSTRIAL RESINS
- PROTECTIVE COATING RESINS

PHENOLIC PLASTICS THAT FIT THE JOB

For High Frequency Communication and Detection Systems,

the use of *Catalin's* NEW RESIN 6540

in paper laminates is providing *better* insulation and insuring *better* performance under most adverse climatic conditions. Paper laminates processed with this new Catalin Resin retain the excellent hot punching characteristics required by XXXP NEMA specifications, and measurably raise the electrical and insulation resistance values for VHF applications. Catalin is particularly proud of this, and other new original Resin formulations recently developed in our research laboratories. These resins are raising quality standards and lowering production costs in many industries.

CATALIN CORPORATION OF AMERICA • ONE PARK AVENUE, NEW YORK 16, N. Y.

Producing . . . **Laminating Resins** for decorative, industrial and electrical applications . . . **Tooling Resins** for the aircraft industry . . . **Casting and Binding Resins** for sand cores, core or match plates . . . **Bonding Resins** for abrasives . . . **Glueing Resins** for furniture, wood and plywood . . . **Crease-Resistant Resins** for fabrics and textiles.

Average Results of Tests made at Catalin Laboratory on Sample Laminates Produced with New Catalin Resins.

PANEL THICKNESS 1/16"

24 hour Water Absorption, %	0.46
Electrical Properties (as is)	
*Power Factor	0.0263
*Dielectric Constant	4.12
Electrical Properties (after 48 hrs. in water)	
*Power Factor	0.0257
*Dielectric Constant	4.18
Insulation Resistance—Immersed 48 hrs. @ 50°C., Megohms	36,400

*(10^8 cycles)

MODERN PLASTICS*

VOLUME 28 FEBRUARY 1951 NUMBER 6

CONTENTS

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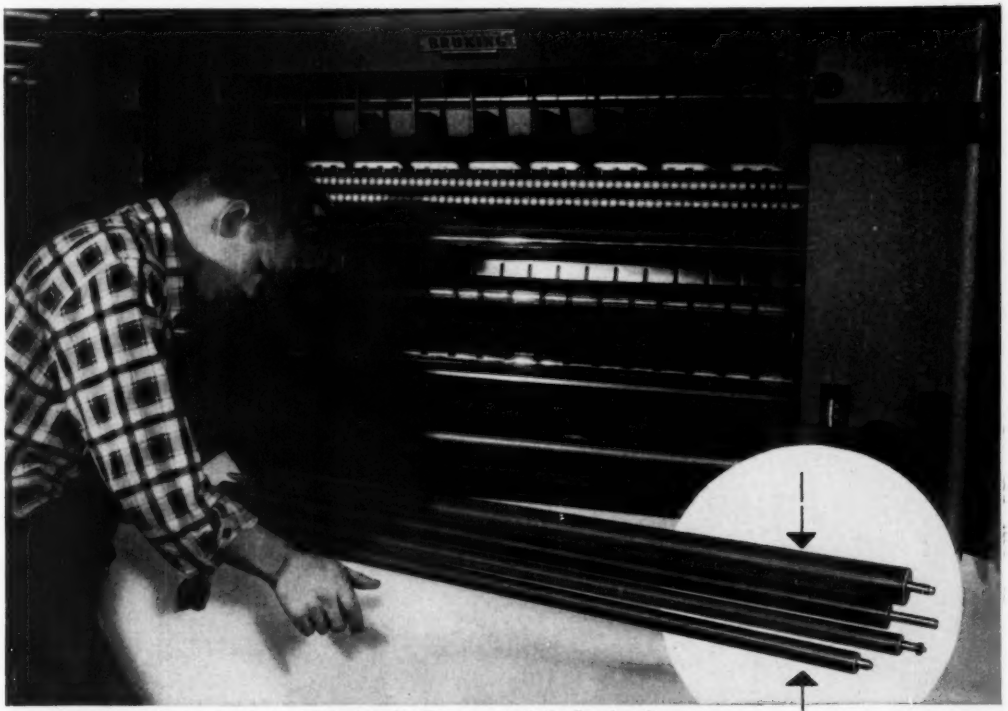
*Reg. U.S. Pat. Office.

Another new development using

B. F. Goodrich Chemical Company *raw materials*



B. F. Goodrich Chemical Company does not make this duplicating machine. We supply materials for the roll coverings only.

Parts improved-tool replacement costs cut 88% | WITH GEON

WHEN you make a product better —make it last longer—and reduce costs, too, you've done a whale of a job! That's just what happened when Geon replaced plating as a covering for the developer rolls used in this duplicating machine.

The rolls must be grooved to apply a metered amount of developer by capillary action for the "copyflex" process. Formerly, the rolls used were all-metal. Machining the alloys was a "tricky" and expensive job. Plating the rolls brought more problems. "Capping"— uneven distribution of plating on the caps of the groove teeth—was one. And metal-damage caused by chemicals in the developer fluid was another. A new kind of covering for the rolls was needed.

Experiments with Geon materials settled the problems. Because of Geon's extreme resistance to chemicals, such damage now is negligible. The Geon compound's superior machineability over metal alloys provided even greater advantages. In one operation the Geon roll covering is machined to a tolerance of ± .0002. And the cutter cost per roll was slashed from $3.60 to 40 cents—an 88 per cent reduction!

Geon may help you improve products—cut costs. It can be compounded to resist heat, cold, chemicals, and many other damaging factors. We make no finished products—supply raw materials only. But we gladly give technical help—especially valuable where government specifications call for vinyl materials. Write Dept. GA-2, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio. Cable address: Goodchemco.

GEON RESINS • GOOD-RITE PLASTICIZERS . . . the ideal team to make products easier, better and more saleable.

GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers

EDITORIAL

Let's Use the Word "Plastics" with Pride!

If there is any group of people who should take pride in plastics and what has been done with plastics, it is the membership of the Plastics Industry. And, on the whole, we believe these men have this pride.

There are a few flagrant exceptions where this pride is lacking. But these are of such size and importance that their lack of pride in plastics leads to misunderstanding and indifference on the part of the consuming public, the distributive trades, and the popular press.

When, for example, a big nationally advertising manufacturer of plastics products never uses the word "plastics" in his advertising, which is read by millions, but insists that he produces a "synthetic," the damage he does to the prestige of plastics is literally incalculable. This is only one case. There are others. Even certain pioneers in this industry, when they got into the business of producing proprietary consumer goods, retained their early inferiority complex about plastics and, by simply not pointing up the fact that their products are plastic, created confusion in the minds of consumers.

One phase of the impact of this negative approach to the use of the word "plastics" in promotion and advertising is the public relations phase. Small wonder that current newspapers, discussing impending shortages of aluminum, steel, rubber, and other materials, frequently suggest the possibility of industry looking to plastics as substitute or replacement materials. The newspapers do not know that plastics are vital materials in their own right, are just as strategic in the mobilization program as any other materials, and are already in shorter supply than some materials which it is suggested they replace.

This appears to be a most suitable time to kill this misconception of plastics as second rate substitutes. There has never been a time when plastics were more important in both military materiel and consumer goods. The objective can best be attained if everyone connected with the industry will adopt a positive attitude toward the materials by which they earn their living and, in all promotion and advertising, come out flatly in favor of plastics without any hedge or reservation. A few years ago this industry learned an important lesson when a few misapplications caused all plastics to be damned for a time. The misapplications were killed off by pressure from within the industry and public opinion from without. And the public came to appreciate plastics to the extent of doubling this industry's business since that sad time.

Why can't we, all of us, accept cheerfully and with dignity the public appreciation of plastics and the public approval of the name "plastics"?

Why don't all of us in every piece of advertising and promotion, in every interview, in correspondence, and in conversation proudly assert that we make plastics or make things out of plastics? It is always the few people in an industry who lack final faith in that industry and its materials who do damage to the rest by public admission of that lack of faith.

Let's kill all thought of plastics as substitutes. Let's emphasize their tremendous importance in peace and war. Let's use the word "plastics" with pride!

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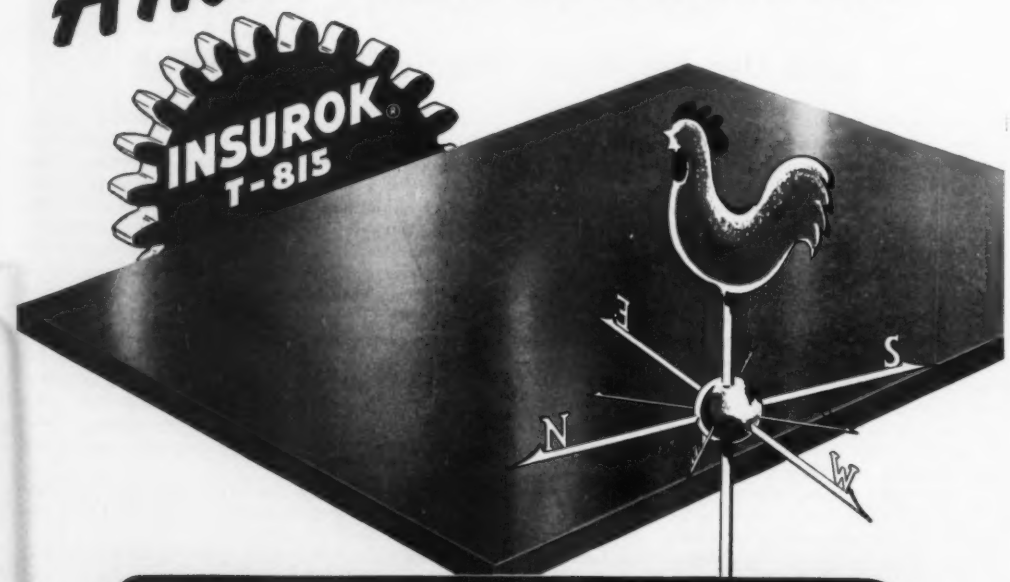
A New REINFORCED LAMINATE For Gears and Mechanical Parts



Provides UNIFORM STRENGTH IN *ALL** DIRECTIONS

Plus . . . Smooth Mechanical Finish . . . Good Electrical Properties

Its reinforcement is different! . . . that's why this new material provides such a unique combination of properties.

Instead of woven fabric, new INSUROK T-815 is reinforced with unwoven cotton fibres, random-laid in the form of a mat. Thus, it exhibits high uniform strength—in the main direction, cross direction, and *all intermediate angles!* This property is valuable in gears and other mechanical components, where teeth or other sections must have equal strength.

But Grade T-815 has more than uniform strength. Its electrical properties are good, and it machines well to smooth, clean surfaces, with finish and texture superior to any cotton fabric-base laminate made. Furthermore, T-815 can be punched—hot or cold, depending upon the thickness—making it valuable for thin electrical parts requiring high strength.

Investigate new INSUROK T-815 for your product, today.

******All directions in the plane of the sheet*

The RICHARDSON COMPANY

FOUNDED 1858—LOCKLAND, OHIO

2789 Lake St., Melrose Park, Illinois (Chicago District)

SALES OFFICES: CLEVELAND • DETROIT
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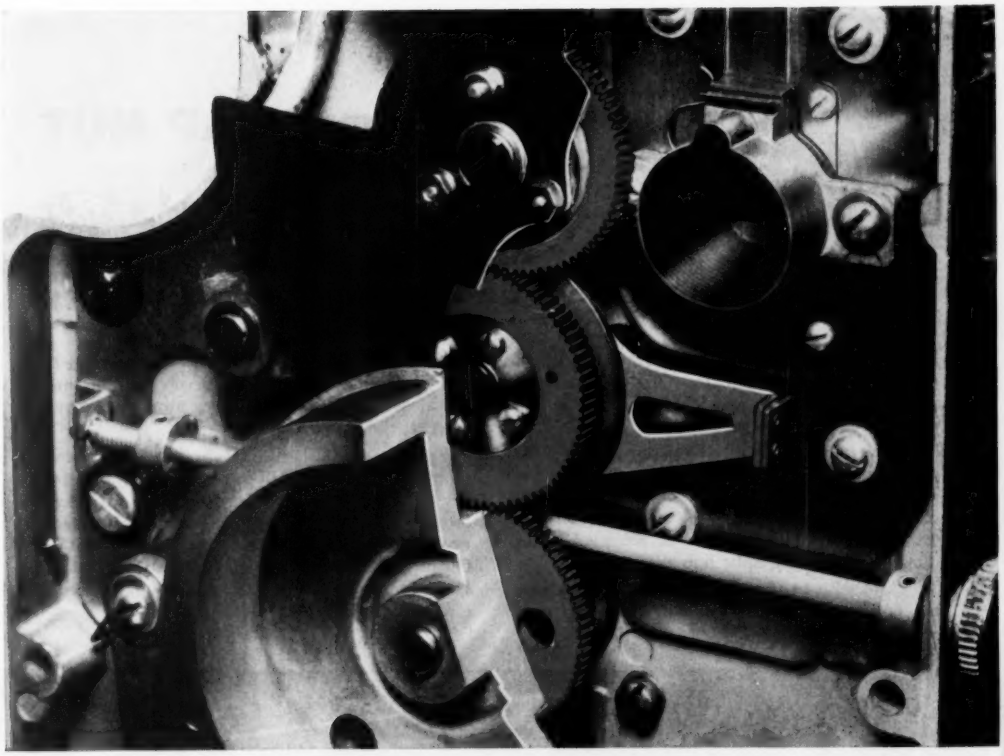
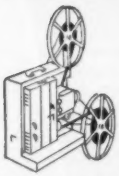
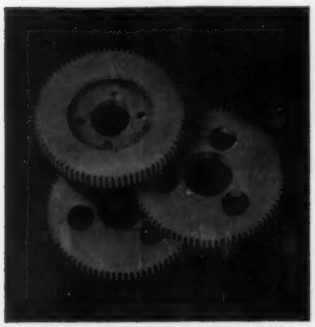




RCA PROJECTOR IS GEARED FOR ECONOMY WITH MOLDED DU PONT NYLON

Nylon plastic gears cost 1/3 to 1/5 as much as former gears . . . give superior performance . . . last over 3 times longer!

". . . an excellent example of the right material in the right spot." That's what RCA says about these nylon gears, used to drive the projector intermittent in their RCA "400" 16-mm. sound film projector.



Lighter in weight, yet more durable than former gears, nylon gears are injection-molded 1⅝ inches in diameter with 48-pitch teeth. They are used in the drive revolving at 1440 r.p.m.

To begin with, mass production with injection-molded nylon enables RCA to make these gears at 1/3 to 1/5 the previous cost—a substantial saving. And nylon's resilience permits gear tolerances to be increased. Smooth-running nylon absorbs vibration . . . provides a quieter, more efficient gear drive that *requires no lubrication.* With all these outstanding properties, the nylon gears operate *over three times longer* than former gears!

Nylon plastic may well help you, as it has many other companies, to improve your product or effect savings. Demand for nylon currently exceeds supply. However, we suggest you investigate the versatile properties of nylon for future application. Experimental quantities are available. For additional information on nylon and other Du Pont plastics, write:

E. I. du Pont de Nemours & Co. (Inc.)
Polychemicals Dept., Sales Offices:
350 Fifth Ave., New York 1, N. Y.
7 S. Dearborn St., Chicago 3, Ill.
845 E. 60th St., Los Angeles 1, Calif.

DU PONT
PLASTICS
Better Things for Better Living
. . . through Chemistry

it shouldn't happen to a Toy...

IT WON'T WITH ACETATE PLASTICS

A plastic shouldn't qualify as a material for toys just because it's brightly colored and low in price.

No—toys need toughness too . . . the shatterproof toughness and durability that toys always have when they're made of ACETATE plastic.

If you are up-to-date on ACETATE you know that this quality plastic is a virtual *must* when you want a toy that won't break in shipment . . . won't break in play . . . won't develop sharp, jagged, dangerous edges.

Celanese* ACETATE is odorless, tasteless, nontoxic and safe. It is the plastic that more and more toy manufacturers are depending upon to give their products a competitive lead.

Celanese Corporation of America, Molding Materials Dept. 101-B, 180 Madison Avenue, New York 16. In Canada, Canadian Cellulose Products, Ltd., Montreal and Toronto.

Celanese* PLASTICS

*Reg. U. S. Pat. Off.

THE "WELD" DRESSED GIRL WATCHES HER SEAMS!

She Rides on Quilted Plastic Seat Covers Seamed by

Thermatron*

ELECTRONIC SEALING AND HEATING EQUIPMENT

*REG. U. S. PAT. OFF.

THERMATRON likes to get down to the "seat" of the problem . . . likes to prove to plastics fabricators, their production men and stylists what an advantage *electronic* sealing has over the power sewing machine it has made obsolete.

Take quilted plastic seat covers. They are now produced on the THERMATRON to sell in volume at popular prices. The old-time laborious *stitching* operation made quilted seat covers impractical.

THERMATRON welds, doesn't stitch, vinyl plastics. Produces controlled seams airtight and watertight that outlive the plastic itself. . . . Gives the stylist tremendous latitude in design. Fact is, the modern THERMATRON sealing method has permitted the development of a whole range of best-selling products which a short time ago were considered impossible to manufacture.

When this revolutionary equipment affecting your industry is available *now*, isn't it time to consult THERMATRON engineers about your plastic sealing problems? No obligation, of course.

Standard THERMATRON models from ¼ KW to 6 KW weld vinyl from .002" up to .080", serving most requirements—or we can build to special application. Equipment also available for sealing cellulose acetate, and for electronic gluing of furniture and other wood products.

Write us for our latest Bulletin No. 57.

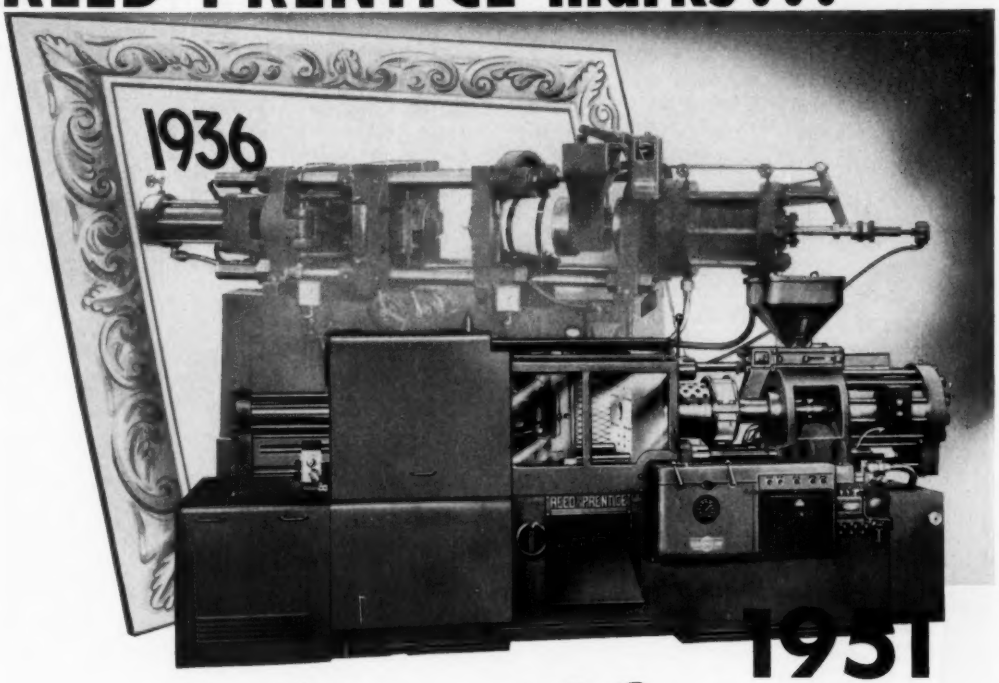
Product of **Thermatron** *Division*

RADIO RECEPTOR COMPANY, INC.

Since 1922 in Radio and Electronics

Sales Dept: 251 West 19th St., New York 11, N. Y. • Factory: 84 North 9th St., Brooklyn 11, N. Y

REED-PRENTICE marks...



15 Years of Leadership

Since building its first plastic injection molding machine — a 2 oz. model still in regular use — in 1936, Reed-Prentice has maintained world leadership in this competitive field through its constant in-the-field research and engineering progress.

Today over 2400 Reed-Prentice injection presses are operating in 40 different countries throughout the world. Molders everywhere acclaim them for their practical design, unsurpassed performance and economical maintenance.

A Reed-Prentice machine will give you a better molding job, fewer rejects and more hourly production. That's why profit-wise molders standardize on "Reeds" — available in 2 to 60 oz. capacities.

THE WORLD'S LARGEST MANUFACTURERS OF INJECTION MOLDING MACHINES

REPRESENTATIVES:

Detroit	Kordenbrock Machinery Co.
Grand Rapids	Joseph Monahan Co.
Syracuse	J. F. Owens Machinery Co.
Houston	Preston Machine Tool Sales Co.
Seattle & Spokane	Star Machinery Co.
Minneapolis	Chas. W. Stone Co.
Portland, Ore.	Star Machinery Co.

INJECTION
REED-PRENTICE CORP.
WORCESTER MACHINES MASS., U.S.A.

MAIN OFFICE:
Worcester 4, Massachusetts

BRANCH OFFICES:
New York 6, N. Y.
Cleveland 13, Ohio
Chicago 12, Illinois
Los Angeles 58, Calif.

did you ever hold a stop-watch on an extruder?

Comparative production figures reveal how remarkably efficient MPM extruders are

● The profits you realize are directly dependent upon the number of usable pounds of thermoplastics your extruder will produce every hour.

When set-up time is excessive . . . when more than reasonable amounts of scrap are produced . . . when *usable* output lags . . . you foot the bill in the form of decreased income.

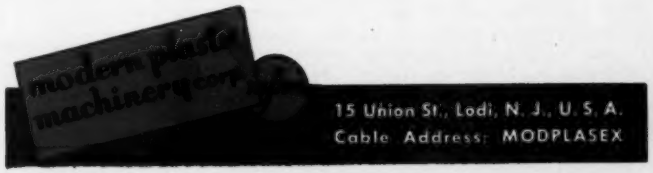
Critical evaluation of the actual *usable* output of any MPM extruder will reveal how these machines can brighten your profit picture substantially. Their outstanding production records result from basic superiorities in design:

- solid corrosion resistant screws and cylinders
- adequate horsepower — more thrust capacity
- built-in heat control and speed indicator
- safety die head of unique construction

MPM extruders are made in five sizes (1½", 2", 2½", 3½", 4½"). One of these machines should be ideal for your needs. In addition, Modern Plastic Machinery can supply all auxiliary extruding equipment, including dies in most cases.

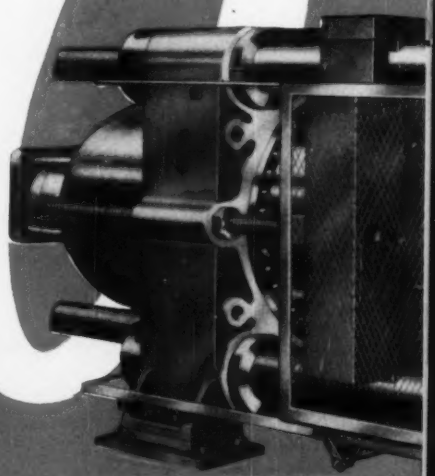
Before arriving at your final decision on extruding machinery, take these three steps: (1) compare *usable* hourly output. (2) check on the number of plastics each machine will extrude. (3) ask the opinion of those who own extruding machines.

We stand ready, at any time, to help you establish a fair estimate of the features and characteristics of Modern extruders or other equipment.



Inaugurating a NEW era

the new 300



Watson-Stillman Injection Molding Machine

DIE SPACE 48" X 72" — CLAMP 1500 TONS

NEW ECONOMY . . . NEW FLEXIBILITY

Significant evidence of Watson-Stillman's ability to anticipate and meet, unusual requirements of plastics molders is the record-smashing 300-ounce Injection Machine . . . NOW-READY FOR YOU.

Fifty per cent larger than its largest predecessor, this—latest—compact unit opens new vistas to every department of plastic products development. **For the designer:** larger integral moldings, heavier sections when needed, without taxing capacity. **For the production chief:** less operating expense and lower maintenance per pound, or unit, of product. **For top management:** greater PROFITS, through broadened scope of facilities, improved competitive position, and all the other advantages naturally attendant upon increased unit capacity and greater over-all production.

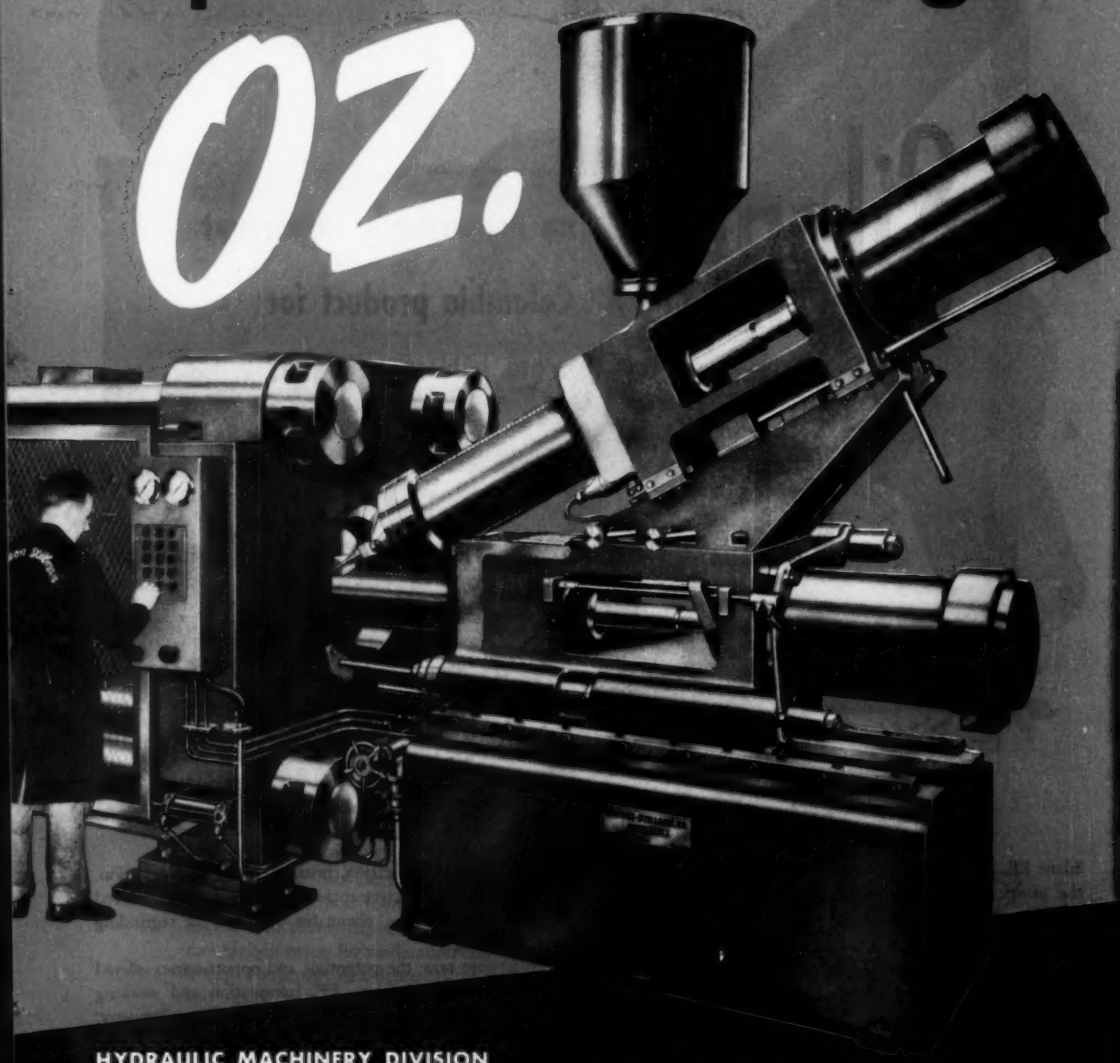
This machine, like others in the W-S COMPLETELINE, was developed to meet existing needs of the industry. Whether you mold one ounce or fifteen pounds, and, whether you need INJECTION, TRANSFER or COMPRESSION Molding Machines, you will find the most efficient, economical, and profitable answer to your equipment needs through the close integration of Watson-Stillman's development and manufacturing facilities which always match the methods and markets of our fast-moving industry.

Remember—when planning plant expansion or a new business — consult W-S first about plastics machinery *and how to use it.*

For 1 to 300 OUNCE MOLDINGS — the W-S COMPLETELINE

in plastics moulding...

OZ.



HYDRAULIC MACHINERY DIVISION

WATSON-STILLMAN

Established 1848—Factory and Main Office, 150 Aldene Rd., Roselle, New Jersey
Branch Office: Chicago, Ill. Manufactured in Canada by—Canadian Vickers, Ltd., Montreal

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Correspondents Throughout the World

9-K-33

. . the shortest distance between production and profit

How PLASTICS Help Make It Hot for Colds

Don't worry about cold bugs! Just get this wonderful Prak-T-Kal Electric Automatic Vaporizer. *And don't worry about production bugs*—even if you need plastic parts to be subjected indefinitely, like these, to boiling water and steam at 170° F. Just ask for Kurz-Kasch production.

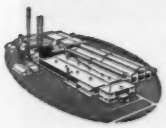
The heart of this "Safest-Rated" vaporizer consists of electrodes located in the plastic cores (A or B, depending on unit size). Water valved into cores is brought to a boil there and generated into steam expelled through moulded-in recess for medication cup in cap. To secure extra-dense castings, the cores are compression-plunger moulded, and the caps are plunger moulded. Result: stable dimensions under all operating conditions without swelling or cracking—no porosity—no shorts—performance rated by a prominent consumer-evaluation service as one of the safest in the field.

Here's a germ (of an idea) we would like to expose you to. Leading manufacturers in *all* lines come to Kurz-Kasch for expert engineering help—for experienced tool-making—for conscientious, dependable plastics production. If you need a thermo-setting supplier, our 34 years of custom-moulding experience should make a strong case for us. Just call.

Kurz-Kasch

FOR OVER 34 YEARS PLANNERS AND MOULDERS IN PLASTICS

(Above) Prak-T-Kal Automatic Vaporizer, by Practical Electric Products, Inc. Approved and Listed by Underwriter Laboratories, Inc. Plastic components moulded by Kurz-Kasch.



Kurz-Kasch, Incorporated • 1415 South Broadway • Dayton 1, Ohio

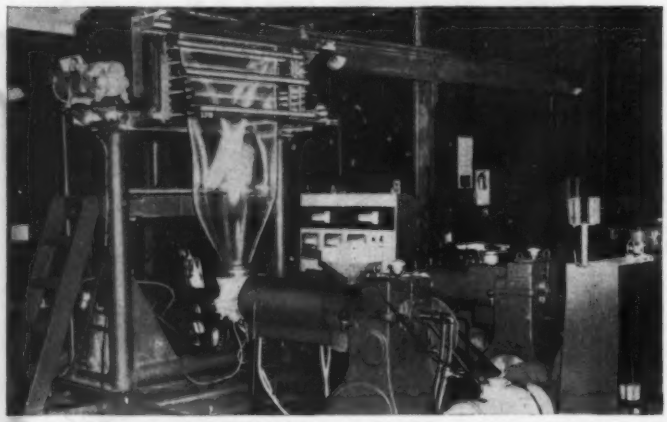
BRANCH SALES OFFICES: New York, *Lexington 2-6677* • Rochester, *Hillside 2415M* • Chicago, *Harrison 7-5473* • Detroit, *Trinity 3-7050* • Philadelphia, *Granite 2-7484* • Dallas, *Lakeside 1022* • Los Angeles, *Prospect 7503* • St. Louis, *Delmar 9577* • Toronto, *Girard 9711* • **EXPORT OFFICE:** 89 Broad Street, New York City, *Bowling Green 9-7751.*

PLASTICS MACHINERY BULLETIN

Reporting News and Machine Design Developments

IN BUSINESS TO NRM REDUCE YOUR COSTS

NEW EQUIPMENT EXTRUDES THERMO-PLASTICS FILM AND THIN-WALL EXPANDED TUBING



NRM thin-wall expanded tubing installation with 2½" electrically heated extruder, 8" die and 48" vertical haul-off.

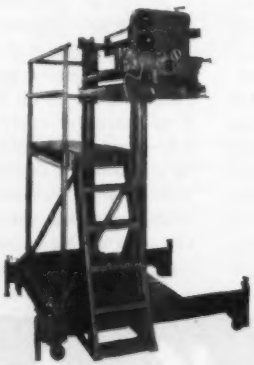
A complete installation for the extrusion of thin-wall expanded polyethylene and PVC tubing for wall thicknesses from .001" up is now available.

Dies of 8", 15" or 20" diameter can be fitted to 2½", 3½", 4½" or 6" extruders. The flattened width of the tubing is dependent on the diameter of the die. The flattening idler roll arrangement of the 48" haul-off can handle lay-flat tubing up to 42" wide. Other designs for tubing up to 66" are also available.

The special single-arm spider die is electrically heated, and has zoned-temperature control which is well balanced.

The vertical haul-off, which can be provided with trimmer knives, has a dual take-up. It is held rigidly in place on retractable jack screws, and easily rolled out of the way on casters.

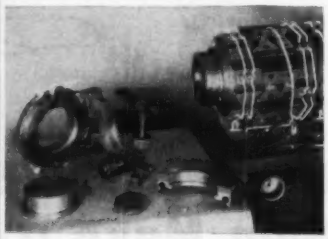
For detailed information, write Plastics Machinery Division, National Rubber Machinery Company, Akron 8, Ohio.



NRM 48" vertical haul-off for thin-wall expanded plastic tubing. Has variable-speed drive, including flattening idler roll arrangement, adjustable trimmer knives and dual take-up.

New Nylon Extruder

NRM now offers a simplified rugged split front flange arrangement holding a standard die gate or PVC crosshead which can be removed readily and replaced with a band heater. The split flange is provided with hinge lugs and two swing bolts.



NRM 2½" Model "50" die gate, sub-die, strainer plate and split-type front flange as removed from cylinder front end of a 2½" extruder. A nylon crosshead or nylon die can now be bolted direct to the cylinder face.

When the flange is removed the small *Nylon* die or *Nylon* crosshead is bolted directly to the face of the cylinder. This avoids critical temperature variations resulting from heat losses of the flange.

INDICATES EXTRUDER SPEEDS

With installation of a special tachometer, adaptable to all NRM extruders, you can now have an accurate indication of screw speeds at all times. A tachometer generator mounted on the gear housing over the input shaft is connected to an indicating dial conveniently mounted close to the feed hopper.

For complete details, write Plastics Machinery Division, National Rubber Machinery Company, Akron 8, Ohio.

NATIONAL RUBBER MACHINERY CO. General Offices & Engineering Laboratories Akron 8, Ohio

PLANTS at Akron and Columbiana, Ohio and Clifton, N. J.
AGENTS East: National Rubber Machinery Co., Clifton, N. J.
West: S. M. Kipp, Box 441, Pasadena 18, Calif.
EXPORT Plastics Machinery: OMNI EXPORT CORPORATION
460 4th Ave., New York 16, N. Y.

Creative Engineering

HOW TO IRON OUT PHENOLIC MOLDING PROBLEMS

The answer is Borden's DURITE.

The handle above illustrates how Borden engineers custom-design the DURITE compound for the job. Through experimentation, heat resistance and low heat conductivity . . . two hard-to-blend features . . . were combined.

For utensil handles, ignition systems, components of electrical equipment, specify Borden's DURITE HR-300. It molds a product that stays strong and lustrous despite heat, has high impact and flexural strength. Its economical 1.39 specific gravity gives you more heat-resistant parts per lb., easier handling and moldability.

In DURITE, Borden gives you the special properties you need, in the degree you want, by skillful combining of cellulosic, carbonaceous and mineral fillers with the resin base. Address your molding problems requiring Phenolic Molding Compounds to The Borden Company, Chemical Division, Dept. MP-21, 350 Madison Ave., New York 17, N.Y.

Borden's DURITE

Molding Powders • Bonding Resins • Cements

Water-and-soap resistance, high impact strength, low-molding cost are featured in the Borden's DURITE phenolic used in this washing machine agitator.

Self-lubrication, high mechanical strength and good finish are special properties of the Borden's DURITE phenolic used in this caster.

High dielectric properties and general durability are special properties of the Borden's DURITE phenolic used in this distributor head.

THE HARVEST

Throughout the years, Columbia's faithful and efficient service has yielded a harvest of continued customer loyalty.

Columbia

CUSTOM MOLDERS OF PLASTIC PRODUCTS AND SPECIAL PLASTIC PACKAGING

COLUMBIA PROTEKTOSITE COMPANY • Carlstadt, New Jersey

New York Showrooms: Empire State Bldg. • West Coast Office: 380 Bayshore Blvd., San Francisco, Calif.

ONE OF AMERICA'S LEADING MANUFACTURERS OF SUN GLASSES, COMBS, BRUSHES, TOYS, HOUSEWARES

Do you Think Boonton Could Solve This Problem?

Sorry! We're not in the business of rescuing at sea . . . . . leave that to the experienced and dependable Coast Guard. But . . . if it's plastics, perhaps we can help—*Perhaps* . . . because there are certainly some places plastics don't belong.

However, if you're "at sea" in regard to a particular molding matter, we'll gladly answer your S.O.S. Send up a rocket—via mail or phone—and we will hop into our plastics helicopter . . . . (*Metaphorically speaking, of course.*)

With both feet firmly planted on terra-firma for over 30 years, we've learned lots of things that can be done with molded plastics . . . and a few things not to try—again.

We have a crew here at Boonton that has weathered many a gale successfully—a group that is as much at home with injection and compression molding as with polytetrafluoroethylene and the intercompatability of plastics.

Why not have a chat with us . . . it won't cost you anything.

BOONTON MOLDING CO.

BOONTON, NEW JERSEY N. Y. Office—Chanin Bldg., 122 East 42nd Street, Murray Hill 6-8540

FROM CIBA RESEARCH

NEW!

A new group of resins of the Ethoxyline class with outstanding properties for

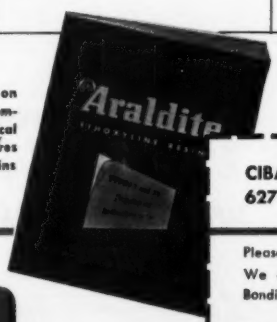
Bonding . . . Casting . . . Coating

Araldite* RESINS

Araldite Resins provide a wide range of practical application for simplifying fabricating methods and improving results. All of the Araldite Resins harden to form thermosetting compounds without evolution of water or volatile matter, and the general result is a resin of high resistance to corrosion with exceptional adhesive properties toward metals, ceramics and other materials and high alkali and acid resistance.

ARALDITE TYPES I & XV*	ARALDITE TYPES 101 & 102**	ARALDITE CASTING RESIN B	ARALDITE 985E
Very high strengths. No pressure needed. Wide tolerances of hardening times and temperature. Adaptable to soldering technique by "flame curing". Bonds well to glass, ceramics, aluminum, brass, etc. *Adaptable to spraying, brushing, or dipping techniques. Unaffected by alkalies, most acids and common solvents.	No volatile solvents. Sets in hermetically sealed places without shrinkage. Good adhesion to glass, metals and plastics. Sets at room temperature. Used as a china cement. **Sets without pressure at room temperature. Can be brushed, dipped or sprayed.	Has been used for bonding glass-glass, glass-metal where lower curing temperatures than Type I were required.	Bakes with strong adhesion to metals, high elasticity and flexibility. Unaffected by alkalies, most acids and solvents, non-toxic, odorless and tasteless used as linings for cans, collapsible tubes and corrosion resistant formulations for protection of magnesium, castings, etc.
Bonds heat resistant plastics for high strength. Type I is relatively inflexible and is less suitable for bonding cloth-wood, cloth-metal than Type 101. *Similar to Type I but liquid form allows easier handling in some cases.	Used as a casting resin with low shrinkage properties. Sets at room temperature. **Has been used as an abrasion resistant, alcohol and alkali resistant coating.	A resin with low shrinkage (0.5-2%) Thermosetting High adhesive properties towards metal inserts. Very good dielectric strength. High acid and alkali resistance. (.7 ft. lbs/in IZOD.)	Araldite 985E has successfully sealed porous castings of Diesel engines and similar castings in aluminum, magnesium, steel, etc.
High adhesion. Used in making inks for glass and melamine plastics. Moisture resistance is high. *Type XV can be used in impregnating and the manufacture of low pressure laminates. *Type XV is readily adaptable to sealing of porous castings of aluminum, steel, etc.	When mixed with filler used as smoothing compounds for body work on aluminum plane fuselages and on aluminum busses. When filled with wood flour used as a shrinkless plastic wood for wood filling and finishing.	*Because Araldite Resins are produced in three easy-to-use commercial forms, the exceptional properties of these new but already extensively applied resins provide fabricators seeking new, improved, simplified, time-and-money saving bonding, casting and coating mediums, with exceptional opportunities to put their ideas to work.*	

SEND THIS COUPON . . . or write us on your company letterhead . . . for complete technical data on the physical properties and recommended procedures for the successful use of Araldite Resins for your own fabricating needs.



* *Araldite is Trade Mark of Ciba Company Inc.*

Ciba

CIBA COMPANY INC., Plastics Division (MP)
627 Greenwich Street, New York 14, N. Y.

Please send me without obligation the new Ciba Araldite Resins Technical Bulletin
We are particularly interested in data on Araldite Resins applications for
Bonding ☐ Casting ☐ Coating ☐

Name.....

Company.....Title.....

Address.....

Shafts take a turn for the better on pillow blocks with TIMKEN® bearings

WITH shafts turning on Timken® bearings, you're assured of long, trouble-free service, virtually friction-free operation, and minimum maintenance, even under the heaviest loads.

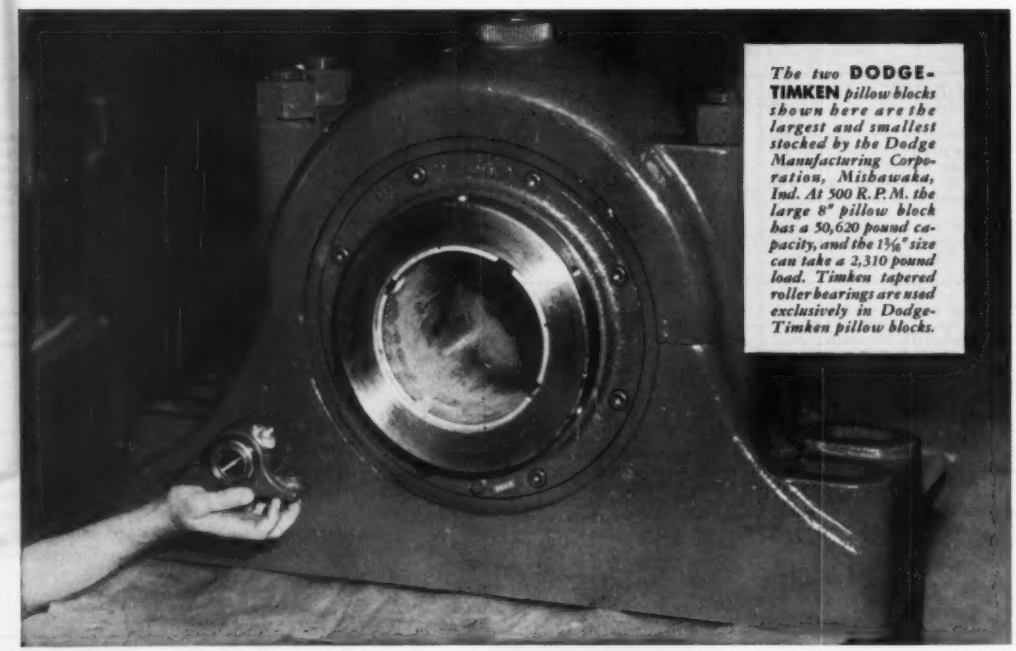
Line contact between rollers and races gives Timken bearings extra load-carrying capacity. True rolling motion and incredibly smooth surface finish make friction practically negligible. Shaft wear is eliminated. And because of tapered construction, Timken bearings can take radial and thrust loads in any combination.

Tighter closures are permitted that keep lubricant in—dirt and moisture out. Lubrication and maintenance costs are reduced.

Timken bearings are made of the finest steel ever developed for tapered roller bearings—Timken fine alloy steel—and under normal conditions will last the life of the equipment with which the pillow blocks are used.

Backed by half a century of bearing research and development, Timken bearings are first choice throughout industry. If you need pillow blocks, specify those equipped with Timken tapered roller bearings. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ont. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.



The two **DODGE-TIMKEN** *pillow blocks shown here are the largest and smallest stocked by the Dodge Manufacturing Corporation, Mishawaka, Ind. At 500 R.P.M. the large 8" pillow block has a 50,620 pound capacity, and the 1 15/16" size can take a 2,310 pound load. Timken tapered roller bearings are used exclusively in Dodge-Timken pillow blocks.*

WE MAKE OUR OWN STEEL

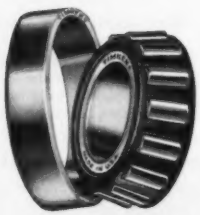
The special grade alloy steel which gives Timken bearings their strength and resistance to wear, is made in our own steel mills.

The Timken Roller Bearing Company is the acknowledged leader in: 1. advanced design; 2. precision manufacturing; 3. rigid quality control; 4. special analysis steels.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS



NOT JUST A BALL ○ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ◫ AND THRUST →◫← LOADS OR ANY COMBINATION

The 'Small Machine' Answer to Material Shortages

1. Production via multiple-cavity molds has a special drawback in times of material shortage. The amount of material in sprues and runners ON MANY JOBS is a critical disadvantage.

2. A single-cavity, mold operating at "Hot Molding" speed on a Fellows-Leominster 3 oz. machine, may yield just as great production... but with a much smaller sprue, and perhaps no runner at all.

3. There may be a 20 times advantage in the *amount* of material to be granulated... the granulating *time* proportionately less.

4. The higher the percentage of virgin material the surer you are of the quality of your output:

   (a) less risk of color contamination

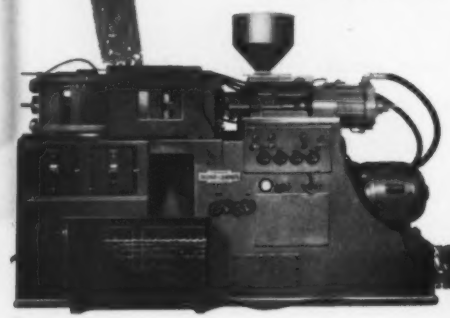
   (b) less chance for inclusion of foreign material

5. Further, molding material inventories need not be so large.

6. And one single operator can tend up to 3 automatic Fellows-Leominster machines. They work so fast that water quenching is used to harden the pieces as they are ejected.

It is very worth your while, in the face of the material shortages now looming up, to investigate the production-rate possibilities of the 3 oz. F-L Molding Machines on your jobs in hand, or in prospect.

Wire, write or phone the nearest Sales Office.

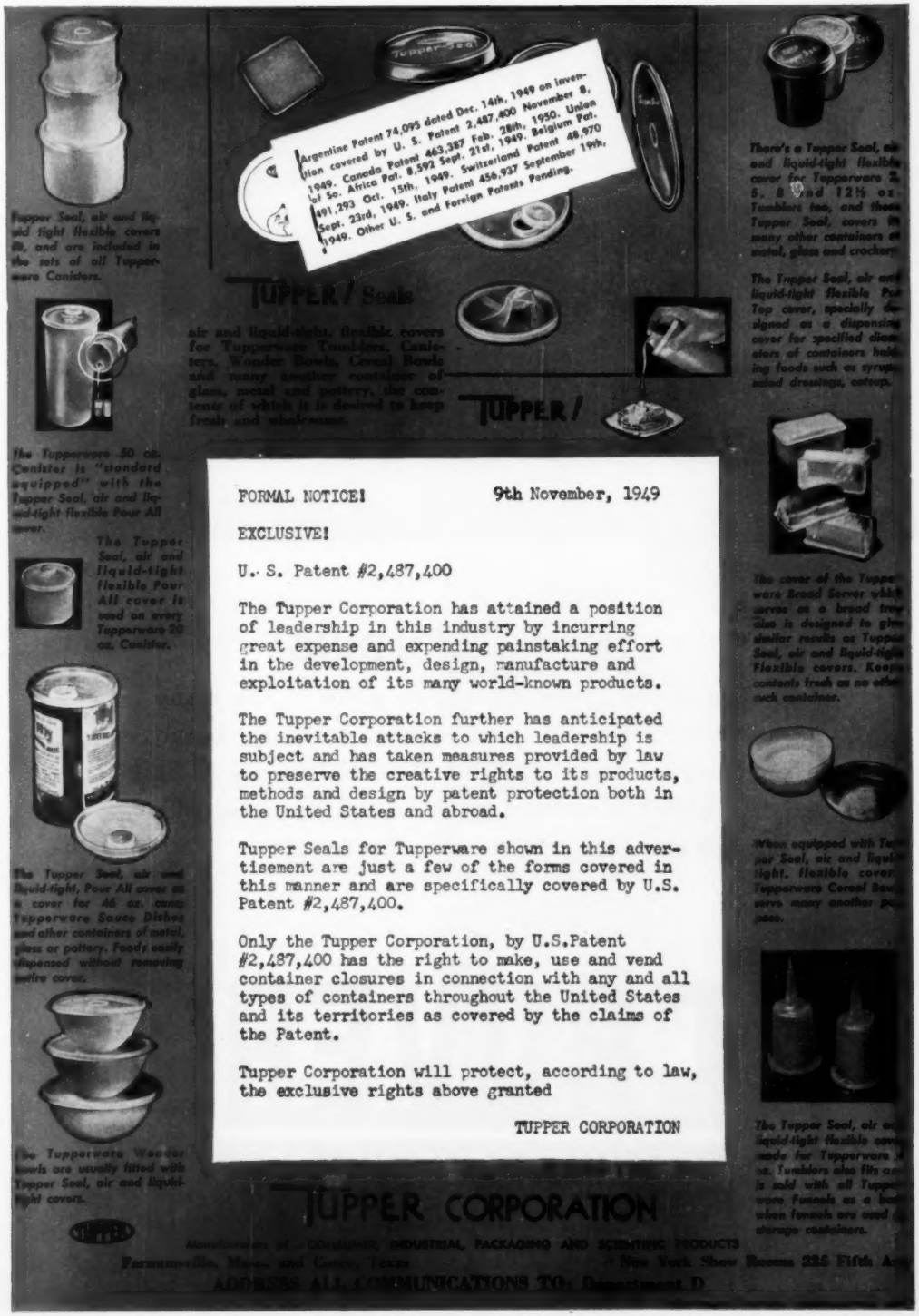


Fellows

LEOMINSTER

injection molding equipment

THE FELLOWS GEAR SHAPER CO., Plastics Machine Div., Head Office & Export Dept., Springfield, Vt. Branch Offices: 616 Fisher Bldg., Detroit 2. 640 West Town Office Bldg., Chicago 12 • 2286 Empire State Bldg., New York 1 • New England Distributor: Leominster Tool Co., Leominster, Mass.



FORMAL NOTICE! 9th November, 1949

EXCLUSIVE!

U. S. Patent #2,487,400

The Tupper Corporation has attained a position of leadership in this industry by incurring great expense and expending painstaking effort in the development, design, manufacture and exploitation of its many world-known products.

The Tupper Corporation further has anticipated the inevitable attacks to which leadership is subject and has taken measures provided by law to preserve the creative rights to its products, methods and design by patent protection both in the United States and abroad.

Tupper Seals for Tupperware shown in this advertisement are just a few of the forms covered in this manner and are specifically covered by U.S. Patent #2,487,400.

Only the Tupper Corporation, by U.S.Patent #2,487,400 has the right to make, use and vend container closures in connection with any and all types of containers throughout the United States and its territories as covered by the claims of the Patent.

Tupper Corporation will protect, according to law, the exclusive rights above granted

TUPPER CORPORATION

CUSTOM MOLDING

The above illustration shows some of the many plastic decorated sign components currently being produced for the ANHEUSER-BUSCH Company of St. Louis, Mo. The material is acrylic and decorated with lacquers and 24K gold (vacuum distillation.)

You get quality vinyls-

using 5-8% less plasticizer- when you use PLIOVIC

Laboratory-tested

You can save on those scarce plasticizers—cut costs—maintain processability—and obtain strength, toughness, flexibility and other desirable physical properties with PLIOVIC, Goodyear's vinyl chloride copolymer.

Because of the more efficient internal plasticizing action exhibited by PLIOVIC, you need from 5% to 8% less plasticizer than with comparable copolymers. Lower fusing temperature makes PLIOVIC unusually processable—on mill, Banbury, calender or in extruders.

Available in Three Types

You can get PLIOVIC in three different types:

PLIOVIC A —a general-purpose, high-molecular-weight, high vinyl chloride content resin

PLIOVIC AR —identical with PLIOVIC A, but with a reduced bulking value, making for easier handling and storage

PLIOVIC AO —gives organosols of high strength, excellent clarity and lower-heat-sealing or fusing requirements

For full details on these laboratory-tested and production-proved PLIOVIC vinyl chloride-type copolymers, and sample for your evaluation, write:

Goodyear, Chemical Division, Akron 16, Ohio

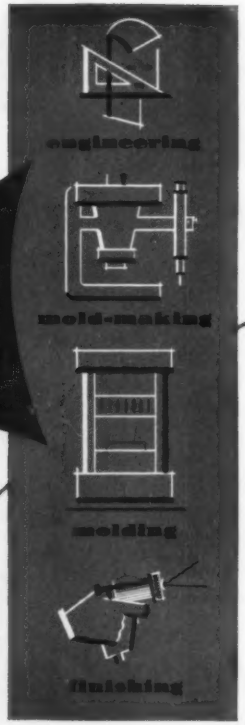
Production-proved

USE PROVED *Products*

GOODYEAR

We think you'll like "THE GREATEST STORY EVER TOLD"—Every Sunday—ABC Network

Pliovic—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio



MOLDED PLASTICS

your key to greater production

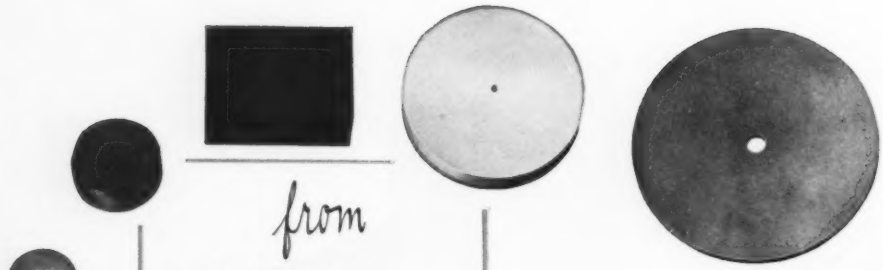
NOW, more than ever before, molded plastics provide you a means to eliminate production bottlenecks . . . a way to get needed precision parts in large quantities—*fast.*

With literally scores of new materials to choose from, plastics afford practically any combination of desired physical properties. Wear-resistance . . . corrosion-resistance . . . resistance to heat and cold . . . strength and impact-resistance . . . these are but a few of the many qualities of present-day plastics, properly molded.

And General Industries—one of America's foremost plastics molders for more than 30 years—is ready *now* with both the experience and extensive facilities to help you with any problem involving the use of molded plastics.

Write *today* for a copy of General Industries' free 16-page booklet, *Your Product in Plastic.*

THE GENERAL INDUSTRIES CO. **DEPARTMENT R · ELYRIA, OHIO**



from POWDER... to PREFORM...

6 Pound Preform
7" Diameter, 4" Thick

These various shapes are PREFORMS . . . all produced on different models of Stokes Preform Presses from 2 to 200 tons . . . General Purpose presses . . . Dual Pressure presses . . . High Speed Rotary presses.

These preforms are all of accurate weight, accurate dimensions, and uniform density . . . all edges are sharp and firm and free from crumbling. Breakage, damage in handling, and material waste are cut to a minimum. There are no soft spots, no under-fills.

Whether for small preforms or big preforms . . . there is a Stokes Preform Press which is perfect for the purpose . . . simple and rugged in design to assure long trouble-free service at high production rates. Adjustments are easily made for pressure, density, weight and thickness while presses are in operation.

Small preforms for buttons and closures . . . large preforms for television and radio cabinets, washing machine agitators, or other large pieces . . . Stokes Preformers produce them quickly and economically.

Mail the coupon for the complete story of Stokes Preform Presses . . . there is no obligation.

STOKES MAKES Automatic and Semi-Automatic Molding Presses, Plunger Presses, Closure Presses, Preforming Presses, Industrial Tabletting and Powder Metal Presses, Vacuum and Special Processing Equipment, Water Stills and Special Machinery.

F. J. STOKES MACHINE COMPANY

5934 TABOR ROAD

PHILADELPHIA 20, PA.

F. J. Stokes Machine Co.
5934 Tabor Road
Philadelphia 20, Pa.

☐ *We are interested in producing Preforms ....." diameter ....." thick.*

☐ *Send me the complete story of your Preform Presses.*

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

Chemicals you live by

2 MONEYMAKERS...

FOR VINYL COMPOUNDING

Chlorowax 40* and Surfex* can be used separately or in combination to lower vinyl compounding costs and increase batch yields with no sacrifice in quality. Chlorowax 40 is DIAMOND ALKALI's liquid chlorinated paraffin which has proved highly satisfactory as a low-cost co-plasticizer. Surfex is one of DIAMOND's precipitated calcium carbonates—a reagent extender of high uniformity and purity.

The table indicates how these two DIAMOND chemicals may be applied in vinyl compounding to produce two-way savings. Specific formulas are available through your nearest DIAMOND Sales Office.

*®

	PARTS	
PVC RESIN	100	100
PRIMARY PLASTICIZER	52	47
*CHLOROWAX 40**	—	15
STABILIZER	3	3
STABILIZER—LUBRICANT	0.5	0.5
*SURFEX**	—	15
TOTAL	155.5	180.5
ESTIMATED MATERIAL COST LB./VOL.	45.8¢	41.6¢
YIELD—% INCREASE PER LB. OF RESIN		(By Vol.)
HARDNESS	85A	85A
TENSILE STRENGTH	2600 psi	2600 psi
ELONGATION	375%	375%
100% MODULUS	1400 psi	1400 psi
CRESCENT TEAR	375 lbs./in.	375 lbs./in.
BRITTLENESS—TEMPERATURE	-31°C	-29°C
HEAT LOSS	5.5%	4.7%

DIAMOND SALES OFFICES: New York, Philadelphia, Pittsburgh, Cleveland, Cincinnati, Chicago, St. Louis, Memphis and Houston. Also representatives in other principal cities.

DIAMOND CHLOROWAX 40 AND SURFEX

DIAMOND ALKALI COMPANY...CLEVELAND 14, OHIO

DIAMOND ALKALI CHEMICALS

SEND FOR IT TODAY!

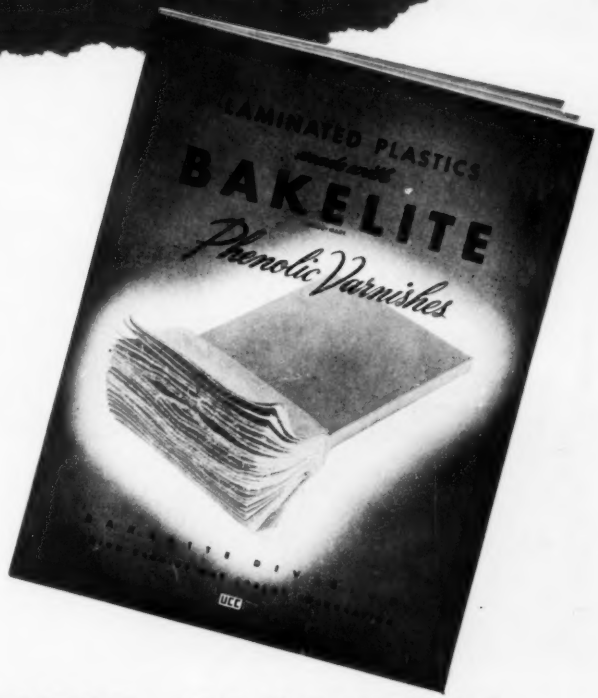
...The **WHAT**

WHY

WHERE

WHEN

and **HOW**



OF LAMINATED PLASTICS!

IF YOUR BUSINESS uses structural materials, decorative materials, or electrical insulating materials—you should know the fundamental facts about laminated plastics made with BAKELITE Phenolic laminating varnishes.

To supply these facts, Bakelite Division offers you a new, 36-page illustrated booklet telling what these materials are, how they are made, and how they can be used to improve the performance, beauty, economy, and sales value of your products.

Case histories of the various types and grades of laminated plastics available for many fields of application are included in the guide book, along with test data on their physical, chemical, and electrical properties, and the methods employed in their fabrication and finishing.

A list of representative manufacturers using BAKELITE Phenolic Resins for the production of outstanding laminated plastics for countless end uses is included. Fill out and mail the coupon for your free copy of this indispensable reference and data book today!

Bakelite TRADE-MARK *Phenolic*
LAMINATING PLASTICS

BAKELITE DIVISION UCC

Dept. BL-13
BAKELITE DIVISION, *Union Carbide and Carbon Corporation*
30 East 42nd Street, New York 17, N.Y.

Please send my free copy of "Laminated Plastics Made with BAKELITE Phenolic Varnishes."

*Name*_____ *Title*_____

*Company*_____

*Street*_____

*City*_____ *State*_____

it's a MYSTIK Self-Stik label

For hard-to-label spots on hard-to-label surfaces a MYSTIK Self-Stik LABEL is the answer. Save time, speed production, cut costs with this fast, modern method for hand labeling. No moisture . . . just press on. Flexible, high stretch for complex surfaces. Water and moisture resistant . . . washable. Resistant to scuffing and delamination. Can be beautifully printed in all colors, die-cut to all shapes and sizes. Send us *your* label problems for a MYSTIK answer. Chicago Show Printing Co., 2669 N. Kildare, Chicago 39; 400 Madison Ave., New York.

CHICAGO SHOW PRINTING COMPANY
CHICAGO • NEW YORK
Offices in Principal Cities

Identify and price parts with MYSTIK Labels.

Aluminum foil label for furniture product.

Trade mark label for vacuum ware.

Informative label for plastic table top.

A CASE FOR MEDICAL PROGRESS

The Mills-molded Tenite Plastic case for this Clinitest Sugar-Urine Urinalysis set is truly a case for medical progress . . . for it contains another advancement toward the control of Diabetes. This new method of urinalysis provides the diabetic patient with a simplified method of maintaining a more accurate check on his own condition. The Clinitest is a compact, complete unit in itself and eliminates the heating usually needed for urinalysis. Clinitest literature stresses the durability of its plastic case by stating, "The Clinitest case, made of durable TENITE plastic, will last a lifetime with the proper care." Thus the strength of plastic becomes a definite sales asset to this highly specialized product. This effectiveness is a result of Mills' painstaking production analysis. It is typical of the careful attention given all products molded here. Let Mills' planning do the same effective job for your products. We invite your inquiries.

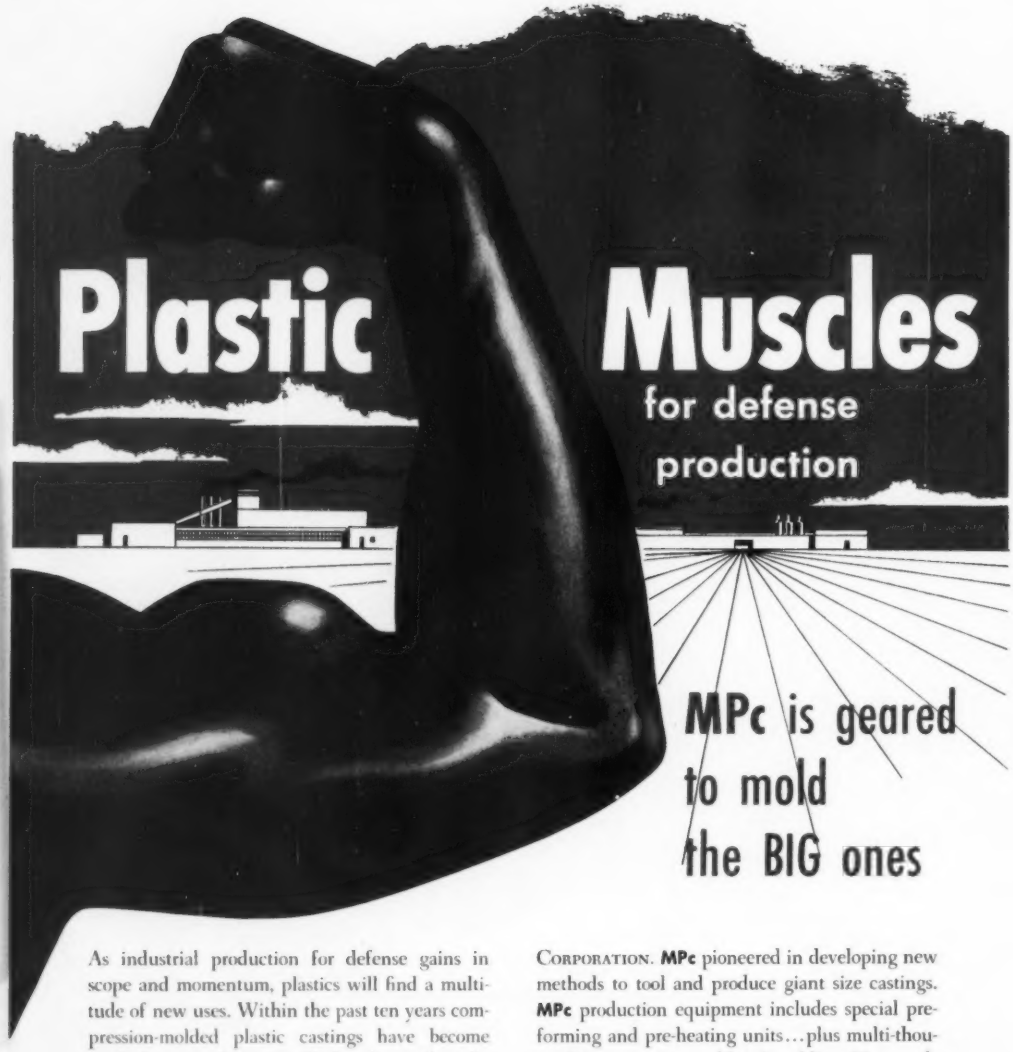
ELMER E. MILLS CORPORATION

INJECTION MOLDERS and EXTRUDERS of: Tenite, Lumarith, Plastacele, Lucite, Nylon, Ethyl Cellulose, Plexiglas, Polystyrene, Styron, Loalin, Vinylite, Geon, Plexene, Polyethylene, Cerex, Fortiflex, CHEMO-PLASTIC*, Saran, and other Thermoplastic Materials.

2930 NORTH ASHLAND AVENUE • CHICAGO 13, ILLINOIS

Write on your letterhead for the new Injection Molded and Extruded Plastics catalog. Or, for detailed information about CHEMO-PLASTIC* pipe, tubing and fittings, write for circulars containing data and illustrations.

*Trade Mark Reg.



As industrial production for defense gains in scope and momentum, plastics will find a multitude of new uses. Within the past ten years compression-molded plastic castings have become vastly larger and heavier. Today the product design engineer can effectively employ plastics in new and unsuspected ways...for housings, containers, structural members...for utensils, handles and a thousand component parts.

The advance to larger, heavier castings has been largely the history of the MOLDED PRODUCTS CORPORATION. **MPc** pioneered in developing new methods to tool and produce giant size castings. **MPc** production equipment includes special preforming and pre-heating units...plus multi-thousand ton presses capable of molding 80 pounds and more per cycle.

Product designers with big ideas are invited to consult with **MPc** engineers.

Address MOLDED PRODUCTS CORPORATION, 4535 W. Harrison St., Chicago 24, Ill.

MPc MOLDED PRODUCTS CORPORATION

"Like finding extra screws in every box!"

"At a time when a shortage of screws can very well set the limits of production, P-K* quality is more important to us than ever. Every screw is formed and hardened properly to drive right and hold right. There are no 'duds', and, believe me, that's like finding extra screws in every box!"

P-K will help in other ways to stretch your screw supply

P-K Assembly Engineers will help you in every way possible to adjust your assemblies to limited supplies. You may be able to use standard screws in place of hard-to-get "specials". By simplifying assemblies, you can sometimes use fewer screws without sacrifice of strength. Reducing multiple head styles, and using fewer diameters, with longer or shorter screws as needed, will also often help you to get improved deliveries.

Parker-Kalon, originators and leading producers of Self-tapping Screws, stand ready to apply their long experience to your most difficult problems of planning and procurement. Parker-Kalon Corporation, 200 Varick Street, New York 14, N. Y.

Sold through accredited Distributors

*TRADE MARKS REG. U.S. PAT. OFF.

P-K
TRADE MARK
REG. U.S. PAT. OFF.

The Original
PARKER-KALON* SELF-TAPPING SCREWS
A TYPE AND SIZE FOR EVERY METAL AND PLASTIC ASSEMBLY

Swedlow.

PLASTICS COMPANY

announces

additional facilities in

YOUNGSTOWN, OHIO

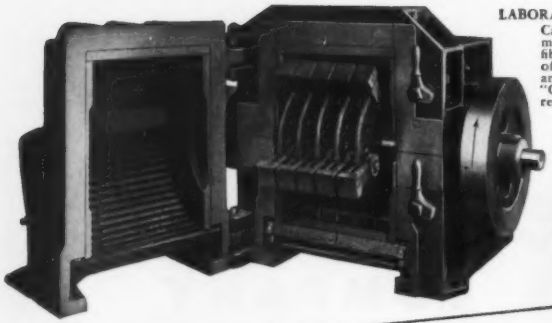
TO SERVE with more speed and efficiency its current customers and the continually expanding needs of Eastern and Middle Western Industries, SWEDLOW PLASTICS CO. has now added a mid-western plant, as complete and modern in equipment and facilities as its West Coast plants.

Swedlow Plastics Co. facilities are devoted exclusively to manufacturing continuous low-pressure laminates and fuel cell backing, in accordance with applicable Air Force, Navy and custom specifications, and custom fabrication of sheet plastics, specializing in aircraft applications and a wide variety of other industrial needs.

- **3435 Malt Avenue**
  Los Angeles 22, California
- **5527 District Boulevard**
  Los Angeles 22, California
- **333 North Meridian Road**
  Youngstown, Ohio

Swedlow PLASTICS CO.

LOS ANGELES, CALIFORNIA • YOUNGSTOWN, OHIO



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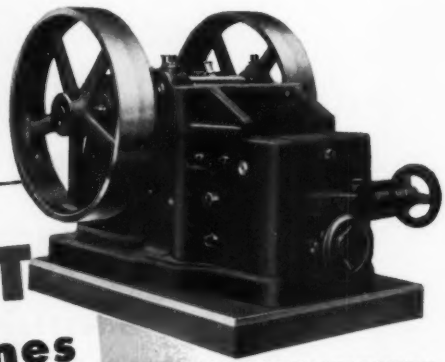
Capable of reducing soft, moderately hard and tough or fibrous materials to any degree of fineness between 1 in. and 20 mesh. The patented "Open-Door" feature permits ready accessibility for cleaning.



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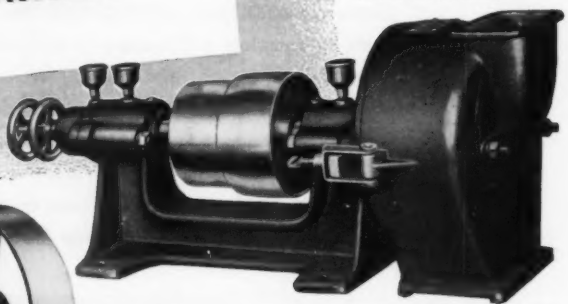
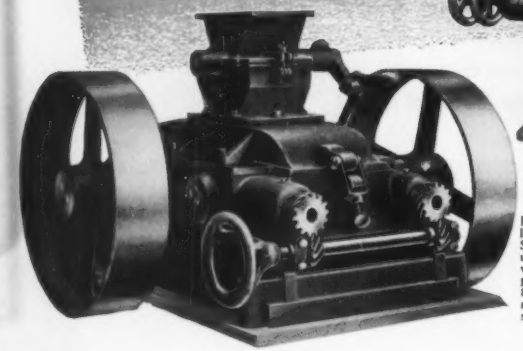
Special Roll Jaw action simplifies close regulation of the product with capacities varying from 300 or 400 lbs. per hour at finest settings, to 1000 or 2000 lbs. when opened for coarser work. Each part of the crusher is accessible for quick and easy cleaning.





LABORATORY CRUSHING ROLLS

First designed especially for laboratory sampling work, Sturtevant Crushing Rolls are used regularly in many plants where there are limited outputs. Range of output for the 8 x 5 size is from ½ in. to 20 mesh — and for the 12 x 12 size from ¾ in. to 20 mesh.

LABORATORY SAMPLE GRINDER

Laboratory Sample Grinders are of the "Open-Door" disc type and are capable of very fine work, producing products as fine as 100 mesh (coarser if desired) when working on dry, friable, soft or moderately hard materials. Simply turn hand wheel to provide product regulation from 10 to 100 mesh.

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Sturtevant Laboratory Equipment meets the exacting requirements of laboratory work. They are fast and accurate . . . provide true samples.

Rugged and dependable, Sturtevant equipment actually has all the features of full size machines plus extra accuracy and wider range of adjustment. The "Open-Door" accessibility permits quick, thorough cleaning . . . prevents the possibility of previous batches from contaminating new samples.

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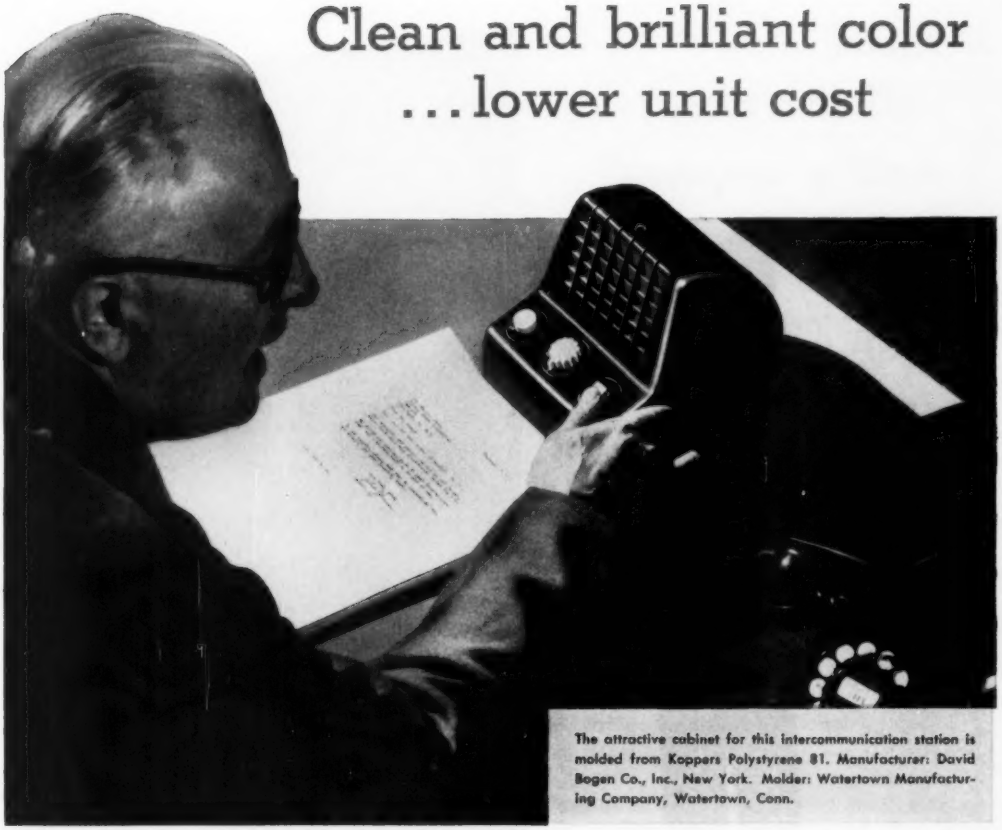

The attractive cabinet for this intercommunication station is molded from Koppers Polystyrene 81. Manufacturer: David Bogen Co., Inc., New York. Molder: Watertown Manufacturing Company, Watertown, Conn.

—because it's molded from Koppers Polystyrene!

• David Bogen Co., Inc., New York, overlooked no possibilities in selecting the cabinet material for its Challenger intercommunication units. Wood, metals and various plastics were evaluated for the application and Koppers Polystyrene 81 was chosen.

"We decided specifically on the use of Polystyrene," says General Manager Sidney Harman, "because of the relatively lower costs per unit which it afforded and because of the unusually clean and brilliant color which could be effected by its use."

Low unit cost is characteristic of products molded from Koppers Polystyrene 81. It results from a combination of low material cost, improved moldability and fewer rejects. The rich brown color of the cabinet is typical of the unlimited range of perfect colors available in Koppers Polystyrene.

Uniform molding conditions and a resulting absence of sink marks were among the benefits in this particular application.

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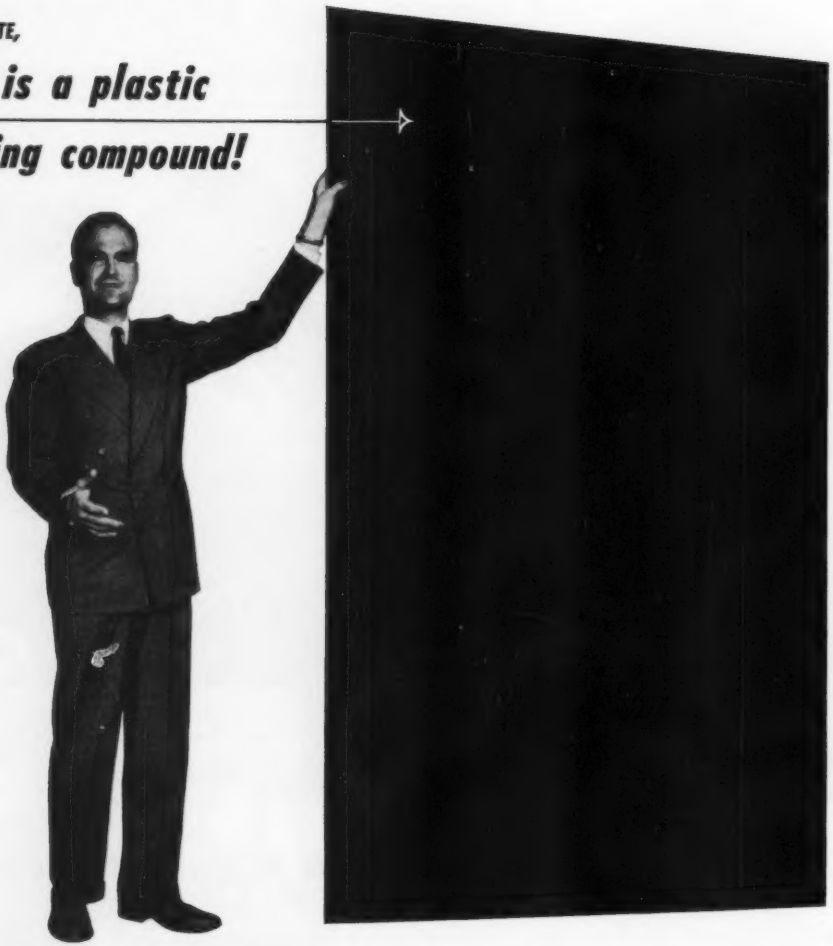

It is one of the FIBERLOYS by Rogers. Ten years ago, Henry Ford made part of a car body from it. Build a big enough press, and you can make entire car bodies from it. Today it is specified in certain military contracts. Tomorrow, we'd like to create a variation of it to meet your special requirements.

PLASTICS by Rogers are special purpose, impact phenolics. They include the only molding compounds produced in sheets. They provide the most efficient, least expensive method of using high impact molding materials. Some are furnished in bulk form for molding. Some are special purpose laminates.

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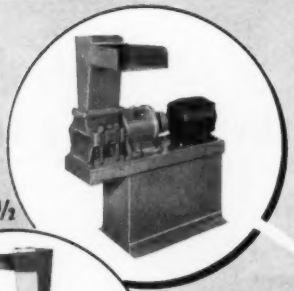
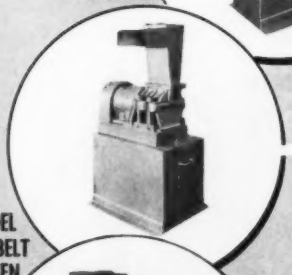
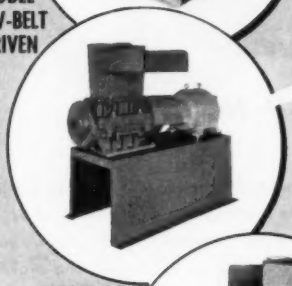
AN ENTERTAINING BOOKLET **— "Here's Rogers and its Fiberloys" will help you decide whether you have a place for the FIBERLOYS. Please write for it, to Dept. P, Rogers Corporation, Manchester, Connecticut.**



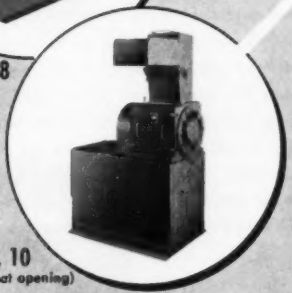
MODEL ½



MODEL ½ V-BELT DRIVEN



MODEL 18



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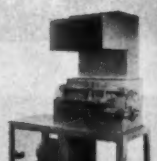

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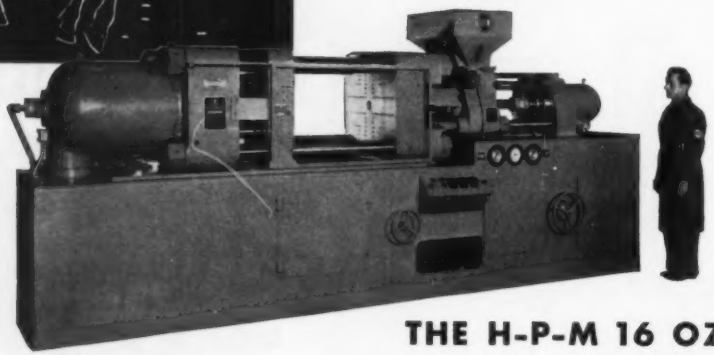

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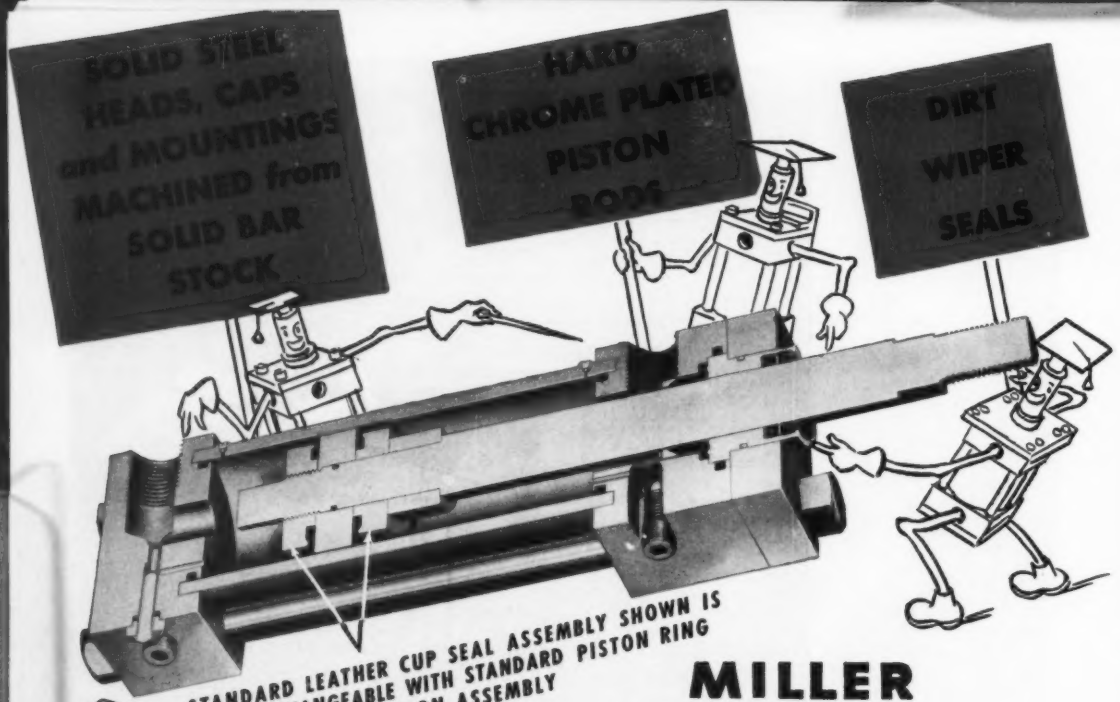

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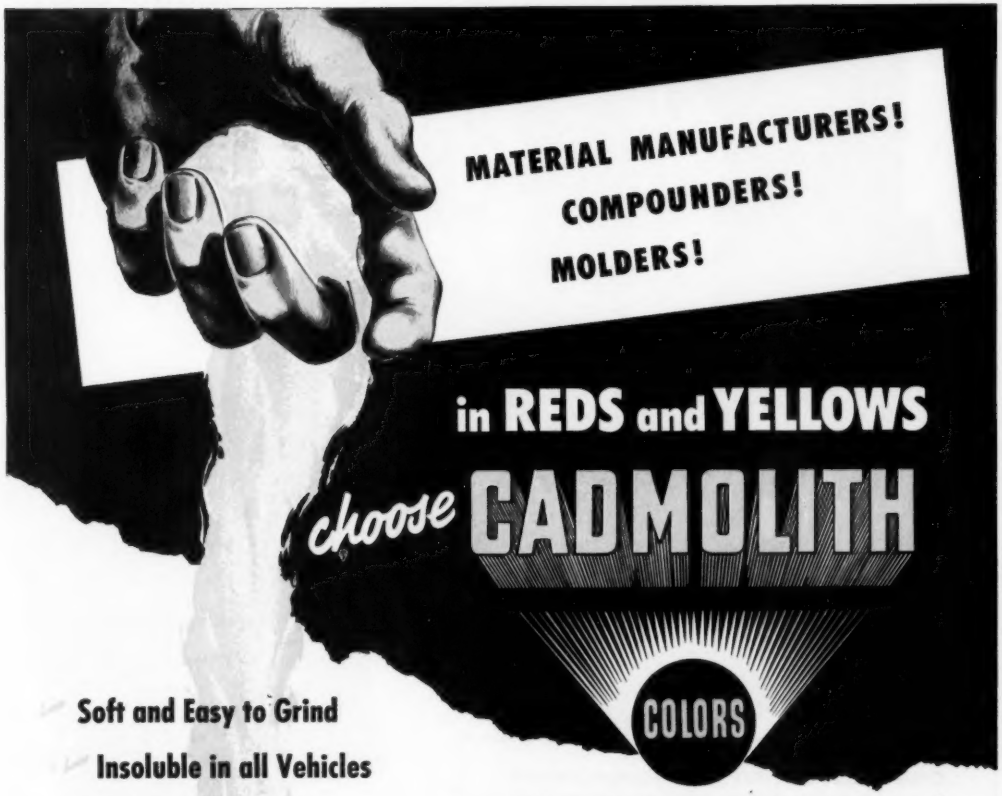

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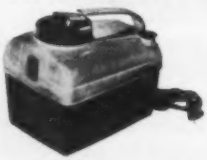

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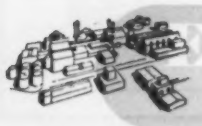

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Modern Plastics BULLETIN

January 17, 1951

Behind the Bulletin

"For the common defense we have thrown up a chicken-wire fence, not a wall of armed might."

Senator Lyndon Johnson, Texas, Chairman of Senate's "Watchdog" Committee for Defense.

For six months the people of this country have been milling around like sheep before a storm, uncertain of which way to turn. In all this skimble-skamble, the plastics industry's doubts about polystyrene, polyethylene, benzene, etc., have been neither greater nor lesser than the doubts of other industries about the supplies of their respective essential materials. Senator Johnson's quotation above epitomizes the common man's feeling about what has been going on in the national scene.

But whatever the fence or wall may be, it is about to be braced and reinforced; after all, it has been built on the good, solid concrete foundation of American ingenuity.

There is a great deal of argument over whether a whole "wall of armed might" should be built right now with what we have, at the expense of all civilian economy, or whether we should build bigger and better pieces with which to construct a strong wall when and if the blow comes. Printed remarks of General Marshall and Charles Wilson indicate that they favor the latter course.

This is an important point for plastics in particular. If the chemical industry is encouraged to provide for all-out military demands on top of its present high civilian demand, the result would be the construction of production capacity for plastics that might equal or even exceed the great expansion which took place after World War II.

Plastics Men in Washington

A serious problem confronting the chemical and plastics industry is the need for experienced manpower to staff the Chemicals Div. and Plastics Branch of the National Production Administration. The chemicals industry was lucky in World War II in that the Chemicals Bureau of WPB was staffed largely with capable, experienced officials who were extremely loyal to both their government and their industry. There was a minimum of petty bickering and a maximum of willingness to listen to industry problems that was not always encountered in some of the other government agencies. If the new Chemicals Div. is to function as satisfactorily as the old, it must be carefully staffed. If a man doesn't know whether benzol comes from a cow or a coke oven, he should have no part in deciding whether benzol is to be used for nylon, DDT, phenol, or something else.

The difficulty of getting satisfactory men to serve is acute. The few on the job are completely snowed under with all manner of detail. One problem in building up a staff is the typical small government salary. There are a good number of former WPB officials at work in industry whose former experience and knowledge would be invaluable in NPA, but they are hesitant to give up their present positions at a financial sacrifice. Experience during World War II indicated that temporary workers are unsatisfactory. They just began to get their feet wet in all the intricacies of government administration, when their companies called them home. It's a big and vital problem of desperate concern to the plastics industry. There are few, if any, industries where specialized knowledge and ability is more important.

Up to date only a few of the old reliable WPB war horses have returned to duty in Washington. Among them are L. A. Schleuter, who has left the American Coke & Coal Chemicals Association to supervise the handling of benzol and other tar acid chemicals; Frank Bennett, who has left Publicker to take over the administration of alcohol and other chemicals; and James Lawson, who will handle chemical and plastics machinery. Robert Kenney of B. F. Goodrich Chemical Co., former WPB chief of the plastics elastomeric

section, and George Sollenberger of Rohm & Haas Co., who supervised the Thermoplastics Section during World War II, are now helping out in counseling on plastics affairs for NPA.

But many more will be needed in different sections of the Chemicals Div. pertaining to plastics when the various types of regulations to be enacted get into full swing. It behooves the industry to keep a sharp look-out on this developing situation and make plans to see that men of experience, capable of making decisions from an unprejudiced point of view, regardless of their former connection, are made eligible for work in Washington. If they are not forthcoming, the industry will have only itself to blame for any ridiculous decisions that may be made in the future.

Polystyrene and Synthetic Rubber

Figures for polystyrene production during the last two months of 1950 are not yet available. Inquiry indicates that November production was almost as high as the previous months—somewhere in the 22 to 24 million-lb. range. December is thought to be down maybe 10%—somewhere around the 19 or 20 million-lb. mark. In January the long-expected decline began to show up; January may be anywhere from 15 to 25% under December. The February and March outlook is uncertain; too many factors are involved, but these months may possibly be slightly higher than January because rubber production has not quite reached the anticipated goal.

There was phenomenally high styrene monomer production last fall: 50 million lb. in September and 52½ million lb. in October, in comparison with a monthly production of around 40 million lb. or less last spring. December production may be down because of material shortages. No figures are available as yet. Incidentally, if styrene monomer were continually produced at the October level, it would require 77 million gal. of benzol for a year's production.

The increase in synthetic rubber production is the most important factor in the reduced availability of styrene monomer to the plastics industry. While production of GR-S from the newly reactivated plants has not quite equalled the more optimistic estimates, government production in December did amount to nearly 40,000 tons, a 10% increase over November. That production required 2 million lb. more styrene for rubber than was used in November. The production outlook for January indicates that styrene consumption for GR-S will be further increased approximately 5 million pounds. In the second quarter of this year, when the government reaches the goal of 63,500 tons of GR-S per month, styrene consumption will be around 13 million lb. a month more than last November.

It is estimated that styrene requirements for rubber from the second quarter on through the year will be on the order of 30 million lb. a month. This figure takes into account a probable reduction in the average styrene content of synthetic rubber. Almost 15,000 tons a month is now 20% styrene instead of the conventional 23.5 percent.

The rubber industry was supposed to use only 90,000 tons of all types of rubber in each of the last four months of 1950. But in September and October the rubber industry used about 111,000 tons one month and 119,000 the other. This increase came about because the government made adjustments for those who claimed they would suffer if their allocation was cut the scheduled amount. It is claimed that a good portion of this rubber adjustment was for the benefit of small business.

The situation became better adjusted in November when new rubber consumption of all types dropped to about 98,000 tons—the first time it was less than 100,000 tons since April. The total for the year was 1,240,000 tons—25% over 1949 and 10% over 1947, the former record year. Of this amount 529,000 tons was synthetic divided as follows: GR-S, 408,000; butyl, 65,000; neoprene, 42,000; and nitrile rubber, 14,000 tons.

Natural rubber shipments from Asia kept increasing through 1950. More than 78,000 tons were imported here in October—the highest since December 1948. The Malayan rubber exports were no doubt higher in late 1950 because the government there was to start levying an export tax in January, and shippers hastened to ship before the tax was levied.

How long will these huge exports keep up? Our own government is doubtless building a stock-pile of around one million tons of natural rubber; experts say we should have a four-year supply and should use at least 25% natural rubber in our total rubber consumption.

It's easy to see that the government doesn't dare take chances on being caught short in rubber when we are in constant peril of being cut off from natural rubber. On the other hand, 760,000 tons of GR-S is a lot of rubber. Numerous non-essentials are still being made in rubber; why is it any more proper that they be made in rubber than in polystyrene? Automobile production will probably be cut at least 25% in 1951; that should save some rubber despite the need for more replacements.

The whole thing is a ticklish, troublesome problem. It is granted that for the next few months our government should do everything possible to get straightened away for a rubber emergency. But until all-out war starts, the plastics industry will continue to covet enough styrene monomer to produce polystyrene for operating at a rate at least equal to 1949 when the average was 15 million lb. a month. In 1950 the average consumption was close to 23 million lb. a month, and that wasn't enough. It is possible that heavy cutbacks in television and refrigerators will lessen the de-

mand for polystyrene by a large percentage, but that factor is not likely to show up to any extent until after the first quarter of this year. After that, rubber will require 30 million lb. of styrene monomer a month out of a total production that runs from 45 to 52 million lb. a month. So somewhere near 20 million lb. of styrene will be available for plastics if styrene monomer producers can get enough feed stock to keep operating at capacity. The answer to that problem lies largely with benzol.

Benzol

One astute Washington veteran in chemical affairs says that until such time as allocations are in force and until military usage is increased, molders are going to have a fearful period of uncertainty insofar as supplies are concerned: the Armed Services are getting first crack at the raw materials used in plastics and these materials may easily be diverted into other fields before the plastics industry gets going.

A chlorine order, which is apparently going to be one of the most unusual orders devised since the beginning of World War II, will probably be issued before this article is printed. And benzol is certainly due for some sort of control other than the inventory order—there isn't enough to put in inventory anyhow!

A committee of benzol users is holding meetings to try to estimate how much benzol will be needed in the next five years. That committee will try to put a little ammunition in the hands of the Petroleum Authority for Defense in order to get some action that will result in production of more benzol from petroleum. Even if new facilities are planned, they can't come in during 1951. The only quick way to get more benzol from petroleum than the current approximately one million gal. a month is to eliminate present bottle-necks; even that process of speed-up won't help too much.

Oil companies claim they are perfectly willing to get into the benzol business, but they want the government to guarantee their market.

Benzol imports of 3,623,433 gal. were reported for September—last month of record. There were almost none in August. Of the above figure, 2,500,000 gal. came from the United Kingdom which is still below the average needed to meet their obligation of 45,000,000 gal. in about a year's time. Czechoslovakia and Poland exported together over 600,000 gal. to the United States in September.

It is difficult to interpret the meaning of the huge benzol production in October. The total, including over one million gal. of motor benzol, was almost 21 million gal., or at an annual rate of 240 million gallons. The annual rate, including petroleum benzol, is not supposed to be much over 180 million gal., but the rate actually exceeded 200 million gal. for two months straight. Old timers in the industry bat their eyes at these figures—say it isn't possible—must be a mistake. Indications are that the figure is inflated by the inclusion of some refined benzol produced from imported crude benzol.

Vinyl and Auxiliary Needs

The vinyl chloride situation was comprehensively covered at the recent Plastics Film and Sheeting Conference in New York. Remarks from that meeting and a few bits gleaned from other sources may be summed up as follows:

The vinyl chloride industry will have capacity for over 425 million lb. of resin by the end of 1951, but it is extremely doubtful if all that capacity can be utilized due to shortages of raw material. That capacity would be at least 125 million lb. more than was consumed in 1950. One of the principal problems involved is to find more military uses for vinyl film and sheeting. At present only 10% of all vinyl is for military use and that is largely for electrical insulation.

At the Film meeting, Dr. Warren Stubblebine pointed out the chief uses for vinyl in the Quartermaster's Department. A recent development is the Arctic Shelter. The walls are essentially "blankets" made up of two strips of vinyl-coated duck between which is a glass-fiber insulation. The whole is locked over a wooden frame. The shelters come in 16-ft. square units; by placing these units end to end it is possible to make a shelter of any length.

The duck for these shelters is coated with high molecular weight organosols or plastisols at a rate of about 2 oz. per square yard on each side. The amount of compound required per square yard, with filler, is 6 or 7 ounces. This same type of coated duck may be used for tarpaulins, bags, and truck covers. Some 8 to 10 million yards have been ordered.

This type material has not yet been used in the ordinary pyramid tent. For one thing, the cloth is so impervious to moisture that tent interiors would fog up. In the Arctic shelter that is no handicap since a stove in the interior furnishes heat which dries the moisture. Ordinary tentage is currently coated with chlorinated paraffin and antimony oxide for fire prevention, but better low temperature resistance and freedom from smudging is desired. Some one may yet come up with a vinyl that will take over this job. The small mountain tents in World War II were vinyl-coated nylon, but the Army is now using water repellent fabric for this job.

Vinyl-coated nylon ponchos were among the best of the plastics adaptations in the last war, but so far none have been ordered for the new defense program.

Vinyl film raincoats, 4 mils or more in thickness, are being tested; rubber-coated fabric raincoats are now standard following some unfortunate experiences with a few lots of vinyl-coated rainwear in World War II. But most vinyl-coated raincoats used then were satisfactory. Some 300 million rainwear items were coated with vinyl in World War II.

A non-toxic vinyl film for packaging has now been produced and may alleviate the polyethylene shortage for ration packs and other products. Dr. Stubblebine emphasized that his department was striving to find ways to utilize available materials and not count too much on scarce products. Among other examples he cited the possible use of saran-coated paper to replace metal foil in some applications.

Plasticizers—As yet no significant slow-down due to plasticizer shortages has been found. If vinyl resin production in 1951 is limited by raw materials to the 1950 level, there may not be the severe shortage previously anticipated. But there is always the possibility that the trend toward diversion of alcohols and acids needed for plasticizers into military uses may interfere with the plasticizer supply.

Plasticizer production was at its peak during the latter half of 1950. If it could run at that rate throughout 1951, it is estimated that the total plasticizer available would be 30% above the actual total of 1950. The trouble is that demand doesn't always run at the same level throughout the year. Consequently, there are temporary periods of severe shortage. If processors could hold a larger inventory of plasticizers, the situation could be alleviated. Some of them have bulk storage facilities for only an eight-day supply of plasticizer.

Stabilizers—At last report it was estimated that there would be an adequate supply of stabilizers for 1951 despite the restricted use of tin, cadmium, barium, etc. The volume of stabilizer production was about 10 million lb. in 1950. Stabilizers consume only a small proportion of metal production. Take lead for example: about one million tons of lead are used annually in the United States. Stabilizers require only 0.25 to 0.3 per cent. In the last war there were no restrictions placed on important small usages of lead. The same principle applied even to tin.

Pigments—Manufacturers have shipped more than 50% more color since the Korean war began than ever before; still the back-order book is the largest it ever has been. Manufacturers think a large part of this increase is in consumers' inventory. No one can predict how much of these materials will be allowed for pigments. Whites will remain tight for the duration with white lead in much better position than titanium or zinc white pigments. Carbon black may remain scarce as a result of the rubber program.

Mechanical Equipment—It is doubtful that any DO orders for machinery used in the vinyl industry will be issued soon. At the present time it is possible to obtain almost any type of equipment needed. The machines used for vinyl require a great deal of Stellite which has a 50% cobalt content. Nickel, aluminum, and copper are also widely used for calenders, mills, etc. But manufacturers have already made plans to make substitutions for these metals.

Plastics Orders

The first NPA order applying directly to plastics, issued Jan. 10, pertained to vinyl acetate. Up to that time, the only regulation was the inventory control which included polystyrene and polyethylene, and a long list of chemicals such as benzol, chlorine, styrene, methanol, phthalic anhydride, titanium pigments, and a few items containing chlorine that are highly important to plastics.

Why polystyrene is included in the inventory control list is not clear. Everyone knows polystyrene is tight, but unlike all the other items in this list, it has not been classified so far as a strategic material. Supposedly it was included on the theory that the order would help small molders obtain more material, and the government is courting the good will of small business. The regulation may have a salutary effect on hoarding, but there is no clear-cut definition of hoarding. The implication is that any person holding excess stock for "re-sale" will be due for an unpleasant interview with Uncle Sam.

The orders restricting use of cadmium and aluminum will have an indirect effect on plastics. Cadmium is banned for products classified as non-essential, and inventories are limited to a 30-day supply. Permission is granted to use cadmium as pigment in luminescent plastic for military use and in plastic fire control instruments for the mounting of optics. No person may produce cadmium chemicals for any use other than the manufacture of pigments for government use. Cadmium pigments, widely used in plastics colorant, had previously become so rare that producers had already given up on expecting any more. Cadmium stabilizers have heretofore been produced in small quantities for use in vinyls.

Aluminum pigments for use in metallic colors are also hard hit. Like other civilian uses for aluminum, the first three months of 1951 will be cut to 80, 75, and 65% of the average monthly consumption in the first six months of 1950. A colorant manufacturer who sold aluminum colorant for vinyl garden hose pleaded hardship on the ground that his heaviest volume months came after March and that it was unjust to base so much of his quota on low volume production months. A later amendment to the aluminum order permits a slight increase in use of aluminum during March if the aluminum is a strictly functional component part and does not exceed 1% of the product's total weight.

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The Work Horse Sets New Records

Improvements in phenolic molding materials and methods have made new applications possible, old applications better

PHENOLIC molding material, the work horse of the plastics industry, "ain't what she used to be."

She is, in fact, a lot better than she ever was. Phenolic materials have been so greatly improved in recent years that new applications are possible and old applications, although they may seem the same on the surface, are more satisfactory.

Some of the improvements have resulted from the development of special purpose materials to meet specific needs for higher heat resistance, greater impact strength, increased insulation value, better flow characteristics, etc. But there have been other changes which are perhaps even more significant: the properties of the general purpose materials are now so much improved that many of them are being used for jobs which would have required special formulations a few years ago.

Flow Characteristics

The most obvious improvements in phenolic materials have been those which made it possible to mold large pieces such as television cabinets, air conditioner housings, etc. All the major manufacturers of phenolic materials have brought out materials specially suitable for molding large pieces. In essence, these materials represent an improvement in flow characteristics over the older phenolics.

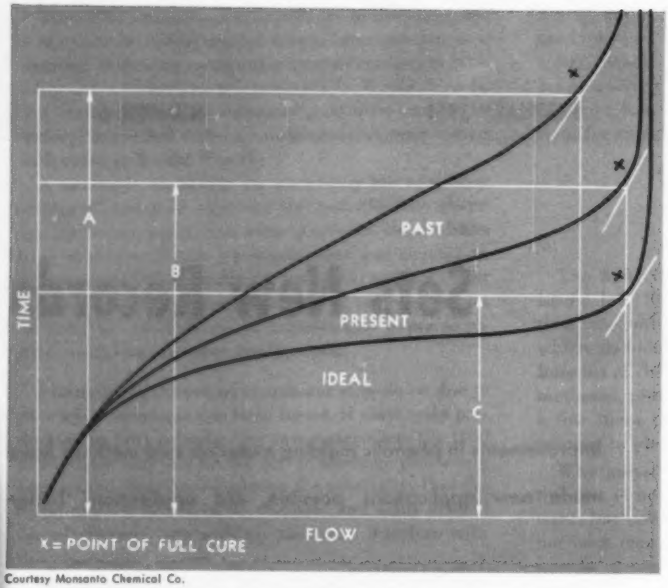
Obviously, a long-flow material (one which stays soft for a comparatively long period of time) is needed to fill out a large cavity. But there is more to it than that. The first so-called long-flow materials stayed soft for a long time, but they also needed an excessively long cure time after the mold had been filled out before they set up hard. What was needed to make large molded pieces economical was a material which stayed soft for a long period of time but which had a sudden and fast cure. Thus a curve of flow versus time for such a material would show almost a flat curve for a certain period with a sharp jump in the curve indicating the sudden and fast cure.

The successful development of the long-flow fast-cure materials has had a number of interesting results. First of all, the new materials made it possible to mold larger pieces than had ever been produced before and, in many cases, these pieces could be produced on already available equipment, because the materials mold satisfactorily at lower pressures.

About two years ago one of the major manufacturers of television sets approached a number of compression molders for quotations on a

Courtesy Bakelite Div.

Heat resistance of general purpose phenolics has been improved so that iron handles, once made only of asbestos-filled phenolic, are now almost all made of G.P. material



Courtesy Monsanto Chemical Co.

Curve of flow time and complete cure. "A" indicates total time of cure for G. P. materials available 10 years ago, "B" for present materials, and "C" for the ideal phenolic

cabinet measuring 2 by 2 by 2 feet. Although some of the molders had presses with sufficient platen area and sufficient opening to take a piece of that size, none of them were willing to take on the job. The materials then available required molding pressures on the order of one ton per sq. in. of projected area. Because of this requirement, the presses then available were not big enough for the job. Today, a piece of that size could be molded with ease on the same presses with the improved flow materials now available.

This reduction in pressure requirements means not only that larger pieces can be molded, but that smaller pieces can be molded more easily, and that smaller presses can be used to do given jobs.

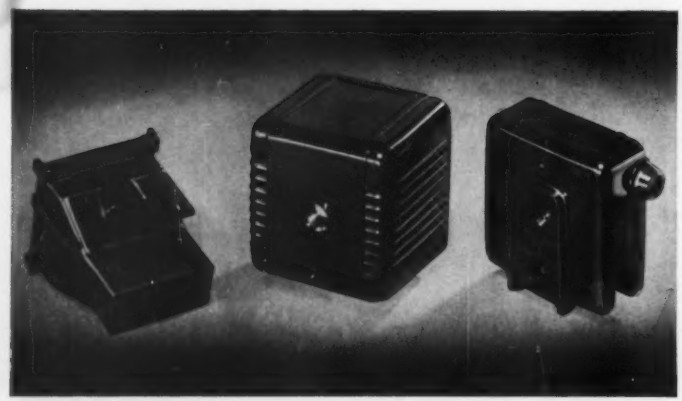
One large molder had a 2-cavity radio cabinet mold which required the use of his largest press, a 600-ton unit. His next largest press, a 450-ton press, would not do the job a few years ago. Recently the molder adopted the new free-flowing material and shifted the job to the smaller press, thus freeing the 600-ton press for another job.

Another example involves a table-model radio cabinet which measures 9½ by 12½ by 8¼ inches. With conventional materials, 375 tons of pressure were needed to mold the cabinet. With a low-pressure material, only 100-ton pressure is needed.

In Transfer Molding

The free flow materials have had a particularly salutary effect on the efficiency of plunger or transfer molding. Obviously, the length of runners is limited by the distance which the material will flow before setting up. The development of free flowing materials thus made it possible to increase the length of runners or number of cavities, using the same amount of pressure. Or, to put it another way, the same number of cavities can be filled out with less pressure when using the free flowing material.

According to the inventor of transfer molding, Frank Shaw, president of Shaw Insulator Co., Irvington, N. J., "the advent of free flowing materials made possible the use of existing molds in smaller presses and made it feasible to design new transfer molds with more cavities than were previously considered practi-



Courtesy Durez Plastics & Chemicals, Inc.

Low pressure phenolic material used in camera makes it possible to compression mold one of the parts (the back) with pressure of only 200 p.s.i. on mold land area and cure of only 55 seconds

Courtesy Monsanto Chemical Co.

X-ray equipment parts molded of mica-filled phenolic operate in mineral oil at 100° F.

cal." As an example, Mr. Shaw cites a 6-cavity mold for large paint brush handles which was designed to run in a 250-ton press. The material must flow 17½ in. from the center of the pot to fill out the mold completely. "Without free flowing materials," he says, "this mold would not have filled out properly unless it had been run in a much larger capacity press."

Often the use of free flowing materials instead of older type phenolics results in a shorter cure time than was previously possible. Thus, table model radio cabinets which required from 3 to 7 min. cure time in 1941 can now be molded in about a third of that time.

Another example of the effect of the free flowing materials on cure time is found in a bomb burster tube which was produced by Mack Molding Co., Wayne, N. J., during World War II. This tube is 1¼ in. in outside diameter and 12 in. long. It is closed at one end and has an external thread at the other end. Because of the length of the piece in proportion to its diameter, the cavity was difficult to fill. The piece was therefore molded with the force plugs on the lower half of the mold; doughnut-shaped preforms were used. The over-all cycle with the only material then available to do the job was 3 min., of which 30 sec. was press travel and mold closing and 100 sec. was total time required for cure. With the free flowing material now available, the piece could be molded in 2 min., 15 seconds. This increase in molding speed is made possible by a reduction in press travel and mold closing time to 20 sec. and, most important, a reduction in total cure time to 60 seconds.

An even more spectacular example of reduction in cycle time comes from the closure field. In 1937, when Owens-Illinois Glass Co. set up closure production with Lauterbach machines, a 20-station rotary machine could produce 25 28-mm. long skirt liquor caps per minute. Today, as a result of improvements in phenolic, the same machine can make at least 50 such caps a minute.

By reducing cure time, the improved phenolics have also made the molding of thicker sections feasible. For example, a duck pin ball is now being successfully molded in one solid piece from G. P phenolic.

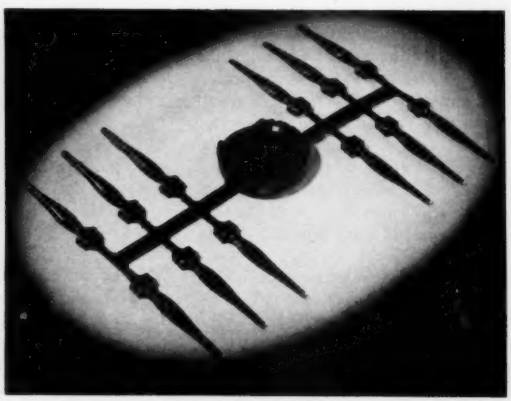
General purpose phenolic ma-

Courtesy Bakelite Div.

Improvements in flow characteristics of phenolic materials have made large pieces, such as television cabinets, possible. Motorola set shown is one of many recent examples

Courtesy Monsanto Chemical Co.

Heat-resistant molded phenolic handles on Ekco Ware can withstand alternate heating to 400° F. and cooling to room temperature



Courtesy Shaw Insulator Co.

Phenolic paint brush handles can be transfer molded in multi-cavity die with lower pressures than were possible without free flowing materials

Special impact test has been developed to give a true indication of the resilience of rubber-phenolic compounds. Three photos above are from high-speed movie of the drop-ball test on a specimen molded of conventional phenolic material. Note that the specimen breaks

Photos courtesy General Electric Co.

Photos above show the same drop-ball test being conducted on a similar test specimen molded of rubber-phenolic. Repeated shocks are applied to the specimen up to breaking point. Test results are calculated in foot pounds of energy required to crack or break the specimen

terials have been improved so much in heat resistance that electric iron handles, which used to be made of asbestos-filled phenolic, are now almost universally molded of G. P. material. The asbestos-filled material was originally adopted because wood flour-filled G. P. materials charred. Thus, iron handles were heavier (because of the higher specific gravity of the asbestos-filled phenolic) and hotter to the touch (because of the higher heat conductivity characteristic of the material).

Now that the heat resistance of the wood flour-filled materials has been raised sufficiently to make them suitable for the application, phenolic iron handles are lighter, cooler, and less expensive to produce. The price advantage results not only from the lower price per pound of the wood flour-filled G. P. material but from its lower specific gravity, which means that 10 to 20% more handles can be molded from a pound of this material.

Radio and television tube bases once made of asbestos-filled phenolic have also been largely converted to G. P., despite the fact that modern tubes operate at much higher temperatures than older type tubes. Sylvania Electric Products, Inc., for example, is molding all of its tube bases of a G. P. material.

For applications which demand greater heat resistance than has yet been built into G. P. phenolic, a number of special purpose materials have been developed. Before and during the last war, for example, manufacturers of kitchen utensils considered phenolic unsuitable for pot handles and used cold molded or hard wood handles. Today it is estimated that 90% of such pot handles are made of high heat-resistant phenolics.

Ekco Products Co., Chicago, Ill., one of the largest manufacturers of pots and pans, makes its handles out of a heat-resistant phenolic material. In order to be adopted for this application, the material has to have sufficient thermal shock resistance to withstand alternate heating to 400° F. and cooling to room temperature over an extended period of time without blistering or losing its gloss.

Another phenolic material is used for roasting pan handles made by National Enameling & Stamping Co., Milwaukee, Wis. This material withstands continuous exposure to 450° F. for 100 hours. In fact, tests showed that after the material is subjected to 450° F. for 24 hr., its physical properties are improved!

One of the best indications of the extent to which the heat resistance of phenolics has been improved is the fact that there are some applications which have shifted from ceramic to phenolic. Although the heat resistance of phenolic is not yet equal to that of most ceramics, the improved phenolics come sufficiently close so that they can often be used in applications where ceramic was previously necessary. An example of this is a group of terminal blocks, formerly made of ceramic for Edwin L. Wiegand Co., Pittsburgh, Pa., and now being molded of phenolic.

Strength

In strength, as in heat resistance, the G. P. materials have been improved, and new special purpose materials have been developed for more exacting applications. One manufacturer estimates that the impact, flexural, compression, and tensile strength of G. P. phenolic has increased from 10 to 20% in the last year or two.

In addition, an entirely new group of high-impact phenolics, the rubber-phenolic compounds, reached the market a little less than two years ago. These materials, made by the Chemical Dept., General Electric Co., Pittsfield, Mass., have the impact strength of ordinary rag-filled materials but the appearance of G. P. They cost about 60% more than G. P. phenolics but their specific gravity is

lower, thus making their real cost about 50% more than G. P. or about the same price as the special purpose impact materials which they usually replace.

The rubber-phenolic materials are about five times as tough as G. P. phenolic. But they can be molded and preformed as easily as G. P., whereas fabric-filled impact materials offer difficulties on automatic preforming equipment.

The rubber-phenolic compounds are so resilient that standard Izod or Charpy impact tests do not give a true indication of their strength. A drop-ball test has therefore been adopted, with results calculated in foot-pounds of energy needed to crack or break the specimen. Stroboscopic photos of this test being conducted on a conventional phenolic part and on the same part molded of rubber-phenolic are shown at the top of the opposite page.

A typical application of rubber-phenolic is the terminal blocks molded for International Business Machines Corp., New York, N. Y., by Consolidated Molded Products Corp., Scranton, Pa., and Prolon Plastics Div., Florence, Mass. These blocks were previously made of flock-filled phenolic, and were unsatisfactory because they often cracked during assembly operations. The design of the parts could not be changed, so a rubber-phenolic material was adopted. The new parts, produced in the same molds as the conventional phenolic parts, proved entirely satisfactory.

Other Improvements

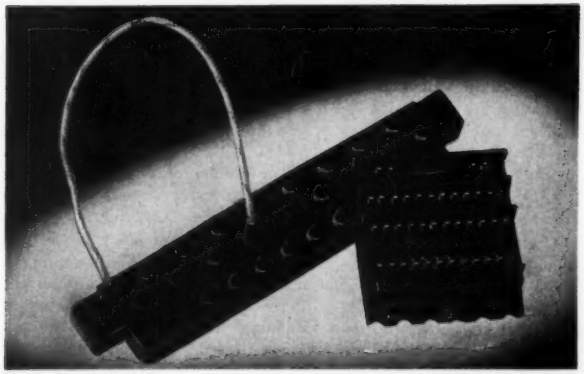
Appearance—Although mottle materials have been available for a good many years, the mottle tended to blend with the base colors whenever the piece was large or the flow long. Mottle materials are available today which hold perfect definition of the mottling for transfer molding as well as in the case of long draw compression molding.

Hardness of Set—Phenolics have also been improved insofar as their hardness of set is concerned. A few years ago many cured phenolic molded items were slightly rubbery when taken from the mold. This made it necessary to use shrink blocks or warping fixtures on any jobs which required even reasonably close dimensional tolerances. This resulted in finished parts with heavy strains set up in them. Such parts were fragile.

The newer phenolic materials set harder in the mold. This decreases the need for shrink blocks, which not only simplifies the production process but also results in better pieces. A molded piece which is cooled without having certain parts of it under stress is usually a stronger piece. Moreover, the newer materials permit more accurate tolerances to be held, even without the use of a warping fixture.

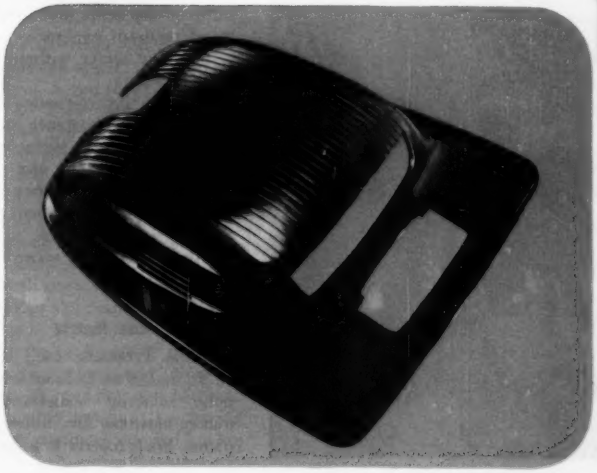
Mica-filled phenolic—The slow cure and poor mold release which used to be characteristic of mica-filled phenolics have been eliminated, and this material is now being used for many coil forms, tuner parts, and other television components.

Another application of this mateterial is in the housings and cable insulators for X-ray equipment made by Machlett Laboratories, Inc., Springdale, Conn. Mica-filled material was used to mold these parts,

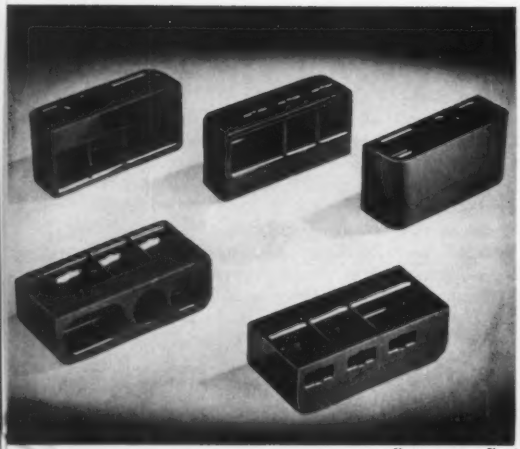


Courtesy General Electric Co.

Terminal blocks for I.B.M. are molded of rubber-phenolic to reduce breakage during assembly operations. Previous to adoption of this material, the blocks often cracked when metal contacts were press-fitted or tapered plugs were inserted



With newly developed low pressure phenolic molding materials, vacuum cleaner housing can be compression molded with 500 p.s.i. on the molded area and cure time of only 45 seconds



Photos courtesy Chemical Div., The Borden Co.

An example of the improvement in heat-resistant phenolics is these terminal blocks which formerly had to be made of ceramic

Matrix for making rubber printing plates is a laminate of impregnated paper and phenolic molding compound which gets full cure after impression is made

three of which operate continuously in mineral oil at 100° C.

Conductive Phenolic

Another major improvement in phenolic materials promises to open the door for the replacement of many chrome-plated die-cast parts by chrome-plated phenolic. This new conductive material, not yet commercially available, was developed by Durez Plastics & Chemicals, Inc.

The unique property of this new phenolic is that it can be directly electro-plated with a coating which will adhere tenaciously to the plastic. Parts molded of the material can be plated directly by conventional methods after merely sand blasting or vapor blasting the surface to be plated. The fact that the material is conductive eliminates the necessity of first applying expensive silver coatings.

The adherence between electro-plated metal and the phenolic is said to be outstanding. Nickel, for example, will plate with a bond strength of over 200 p.s.i. The plated surfaces can be vigorously buffed without causing blisters or pulling the metal from the plastic. Molded items plated with nickel will withstand repeated exposures to dry ice and boiling water without showing signs of failure.

The fact that phenolic has excellent corrosion resistance means that the exposed metal surfaces are not subject to pitting and bleeding troubles so common when plating is applied to metals with poor corrosion resistance. Resistance to outside weathering is good, according to all tests run so far.

Impact strength of G. P. phenolic makes it suitable for use in caster wheels

Courtesy Bakelite Div.

Printing Plate Matrix

Econo Products, Inc., Rochester, N. Y., makes an unusual use of phenolic molding compound. Econo makes matrices for rubber printing plates. Each matrix is a laminate of resin-impregnated paper with phenolic molding compound between the sheets and on top. The laminate is given only a partial cure. Later, when the user has molded the matrix against lead type, it is given a final cure and made hard enough to serve as a mold for making rubber printing plates.

The foregoing discussion has been limited to improvements in the phenolic materials themselves. This is only a part of the story of the improvements in phenolic molding. In addition to changes in the materials, there have been improvements in molding technique, mold design, piece design, and—most important of all—high frequency preheating. Without these concurrent developments, improvements in the material would have had little effect. Taken together, all the improvements are the collective reason why phenolic molding material, the work horse of the plastic industry, is not just plodding along. She is galloping ahead and setting new records.

The text of this article was compiled from information secured through the cooperation of the following companies: Bakelite Div., Union Carbide and Carbon Corp.; Chemical Div., The Borden Co.; Durez Plastics & Chemicals, Inc.; Chemical Dept., General Electric Co.; Mack Molding Co.; Monsanto Chemical Co.; Plastics Engineering Co., Inc.; Shaw Insulator Co.

S. P. I. Film and Sheeting Conference

Highlights of papers presented on progress and trends in the film, sheeting, and coated fabrics segment of the plastics industry

ABOUT 500 representatives of 264 companies in the vinyl business attended the Second Conference of the Plastics Film, Sheeting, and Coated Fabrics Div. of S.P.I. The meeting was held at the Commodore Hotel, New York, Dec. 14 and 15, 1950.

William T. Cruse, executive vice president of S.P.I. presided at the first morning meeting in place of Arthur M. Ross, of Ross & Roberts, Inc., who was prevented from attending by illness.

Embossing

Hans S. Vohs, of Roehlen Engraving Works, Inc., discussed some of the recent trends in embossing techniques. His paper, entitled "A Review of Vinyl Embossing," traced the history of the art of embossing and described how existing techniques had been modified to make them adaptable to use on plastics.

Mr. Vohs pointed out that there has been a decided tendency towards low-pressure roll embossing. The compactness of the equipment makes it suitable for use in conjunction with coating or calendering operations. He also discussed embossing directly against the last calender roll, which he described as a "very limited and extremely difficult" method.

Color Problems in Vinyl

Some of the problems involved in coloring vinyls were outlined by Fred G. Clark of Bakelite Div., Union Carbide and Carbon Corp. His paper, entitled "Color Problems of the Vinyl Film and Sheeting Industry," was illustrated with color slides showing some colored vinyl items and the results of some tests on colored materials.

Mr. Clark discussed the various applications of vinyl film and sheeting and the importance of colorfastness in each. He pointed out that the relative importance of color fastness could not be determined by simply dividing the items into indoor and outdoor applications. For example: an indoor application such as a window shade, which is almost constantly exposed to sunlight, is more apt to fade than an outdoor application like a raincoat, which is rarely worn when the sun is shining.

Mr. Clark then examined some of the methods used in attacking the problem of making a good colored vinyl film. He discussed the heat stability of the colorants themselves and the methods of testing for such heat stability; the problem of proper dispersion of the colorant; and the problems of bleeding and crocking.

In his discussion of methods of testing light stability and weathering, Mr. Clark expressed the view that no accelerated test is a satisfactory substitute for actual outdoor exposure.

Cost factors in choosing colorants were also dealt with, and Mr. Clark proved by example that cost in dollars per pound of colorant is no indication of the actual cost of doing a job. He pointed out that the purest form of a colorant, which costs the most in dollars per pound, is actually the cheapest, provided it can be dispersed properly.

Organosols and Plastisols

"Surface Coatings and Free Film from Organsols and Plastisols," was the title of a paper delivered by George E. Stevenson, Weymouth Art Leather Co. Mr. Stevenson began by covering the compounding stage of the organosol process, including the suitable resins, plasticizers, solvents, diluents, and colorants.

He then discussed the five operations which make up the physical phases of the process: 1) dispersing and grinding the resin to extremely fine particle size; 2) mixing and blending the resin and pigments with the plasticizers and other ingredients; 3) applying the batch to the supporting medium; 4) fluxing the film or coating from one having distribution and form but no film strength to the strong continuous film desired; and 5) embossing or planishing the finished material.

The fourth stage is unique to this process and was therefore discussed in some detail.

Mr. Stevenson also pointed out why, with other methods available, the organosol process should exist. He said that it is more flexible than other methods because it is a multicoat process and permits varying characteristics to be formulated into the different coats. It also lends itself well to protective clear coatings on surface decorations.

Mr. Stevenson also asserted that the organosol process permits the use of higher molecular weight resin and thereby assures a film of added strength and toughness.

Marketing Research

H. R. Thies of Goodyear Tire & Rubber Co., presided at the initial luncheon meeting. The first paper, entitled "The Values of Marketing Research," was delivered by Dr. Vergil D. Reed, vice president of J. Walter Thompson Co. Mr. Reed discussed what marketing research is, how it should be organized, how it should be used, and how it should be coordinated with other company activities.

Vinyls on the Retail Market

Ephraim Freedman, director of Macy's Bureau of Standards, spoke on "Film and Sheeting Products at the Retail Level." The paper was a product-by-product analysis of the vinyl items sold by Macy's, the manner in which they are selling, and the manner in which some of them are failing.

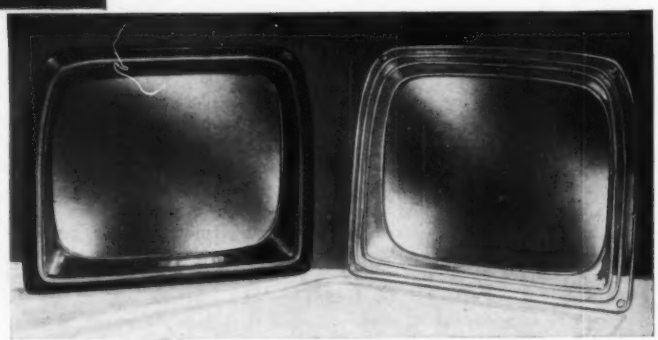
Mr. Freedman reported that customer complaints on shower curtains are rare, but that vinyl table cloths are frequently rejected because of bleeding. He reported that vinyl yard goods sales are behind

(*Continued on p. 164*)

Crosley's Styrene T.V. Windows

Presses that produce large molded parts rapidly are paving new roads for plastics uses

Left: Theater effect of 16-in. T. V. screen is achieved by proscenium-arch design at top of molded styrene picture-tube window and mask. Maximum viewing angle is thus presented to spectators. Below: Injection-molded windows (painted unit at left, unpainted at right) weigh just over 34 ounces



DISTINGUISHING feature of the 1951 line of Crosley television sets is the exclusive Crosley "Family Theater" screen, designed to afford a maximum viewing angle and—to quote the company—to end "T.V. huddle forever." In order to achieve this optical effect, the one-piece molded styrene picture-tube window and mask adopted by Crosley for both round and rectangular tubes on some receivers has been shaped at the top like the proscenium arch of a theater, giving the sets a distinctive appearance and forming a handsome setting for the television picture.

Typical of these molded styrene components is the 16-in. rectangular-type window which is used on several of the current Crosley television receivers. This plastic part, weighing slightly more than 34 oz., is produced by Chicago Molded Products Corp., which also handles the subsequent painting operations on the mask and bezel areas of the piece.

Of particular interest is Chicago Molded's production of this component on a type of injection press first introduced to the plastics industry in 1949—a 64-oz. J-C press made by Jackson & Church Co., Saginaw, Mich. This press differs from conventional molding equipment in that it is a combination of a vertical transfer-type press and a specially built extruder. The extruder completely and uniformly heats and plasticizes the molding material, feeding it directly into the injection chamber in exact one-shot doses. Due to this pre-plasticization process, injection pressures are extremely low.

240 Square Inches

The projected area of the Crosley styrene window and mask is 240 square inches. The part has an average wall section of $\frac{13}{64}$ in., tapering off to $\frac{1}{8}$ in. at the outer edge and in the mask section, which is located behind the window and which serves to restrict the part of the tube face exposed for viewing. The actual window area of the piece slopes slightly forward, reflecting any stray light downward instead of into the eyes of the TV viewers. The part is molded with cored openings in each corner through which it is attached to the cabinet by means of screws. With this arrangement, it is simple to remove the window for periodic cleaning of the picture-tube face.

The part is edge gated at the bottom, on the back side. The round runner feeds into a restricted gate which is semi-circular in cross section, with a maximum dimension of approximately $\frac{1}{8}$ inch. The single-cavity mold is highly polished to a mirror finish, but not plated.

In running this part on the 64-oz. J-C press, Chicago Molded has maintained a molding cycle of less than 2 minutes. Molds are held at a uniform temperature of 150° by means of mold temperature control units developed by the molder. A 600-lb. line pressure is used for injection and a full 2000-lb. line pressure for clamping, to obtain a total clamping pressure of 500 tons. Chicago Molded production men point out that the low injection pressure is an important factor in making completely clear pieces without flow lines.

No Cooling Fixtures

At the end of the molding cycle, the press operator removes the part, clips the sprue and trims off any flash which may occur where the

seven knock-out pins are located on the back of the piece. No cooling fixtures are required. Each component is then slipped into a large polyethylene envelope which protects it against possible damage during transfer to the finishing department.

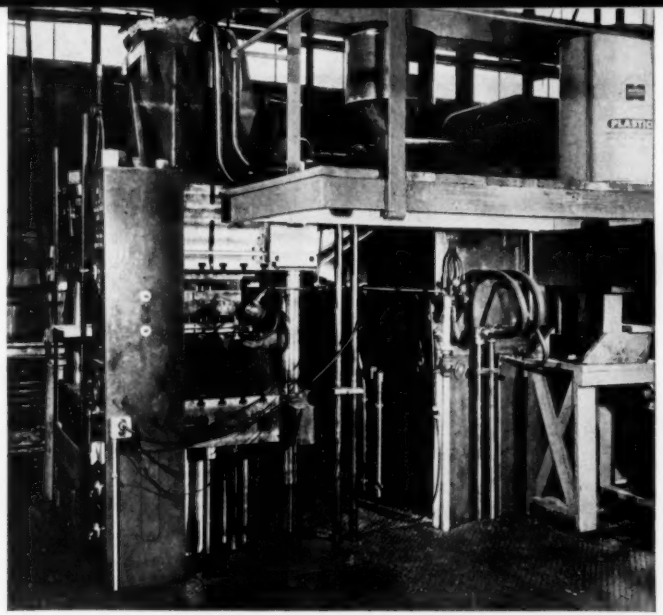
A three-step painting operation on the reverse side completes the finishing of the Crosley television window. Gold, maroon, and green styrene lacquers are applied in spray booths, using successive masks to confine colors to the desired areas. First to be applied is the gold band which separates the inward sloping mask section of the piece from the outer frame or border. Next the maroon lacquer for the frame is applied and finally the green, which shows through only on the mask but also covers the colors previously applied.

A conveyor belt facilitates transfer of the parts to successive painting stations. Between colors, any overspray is immediately removed with an alcohol solvent. When possible, application of each separate color is handled on a different shift to expedite production. Drying of the lacquers was previously quickened by means of an air blast directed at the parts as they moved by on the conveyor belt, but the molder is now installing tube-type heat lamps for more efficient operation.

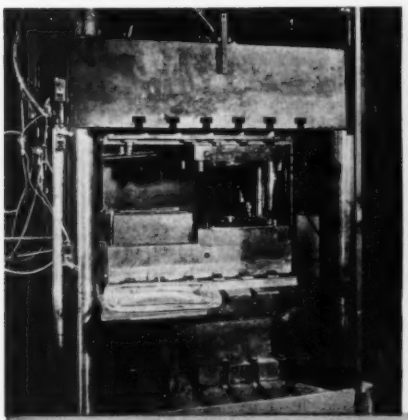
Destaticizing

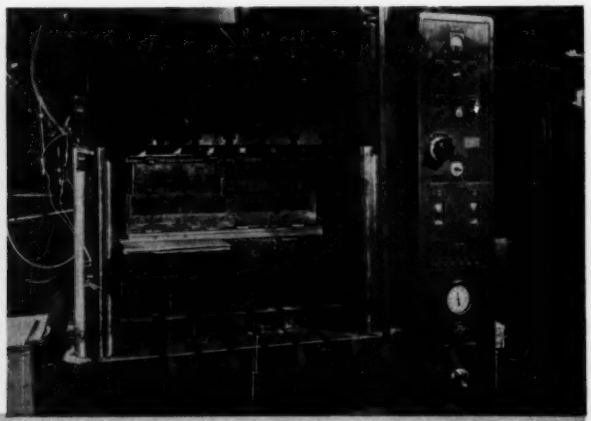
Upon completion of the painting, pieces are inspected, buffed if necessary, and returned to the protective polyethylene envelopes. Then they are placed in corrugated shipping cartons, with a separator between each two units, for shipment to Crosley. Before installing the components in finished sets, the manufacturer applies a destaticizing agent to minimize dust attraction.

The Crosley picture tube window and mask graphically illustrates how large injection molded parts, which would have been out of the question a few years ago, can now be produced on fast, economical cycles with modern high-capacity presses, capable of plasticizing greatly increased quantities of material. Such presses are paving the way to important new plastics applications in television, refrigeration, air conditioning, and numerous other fields.

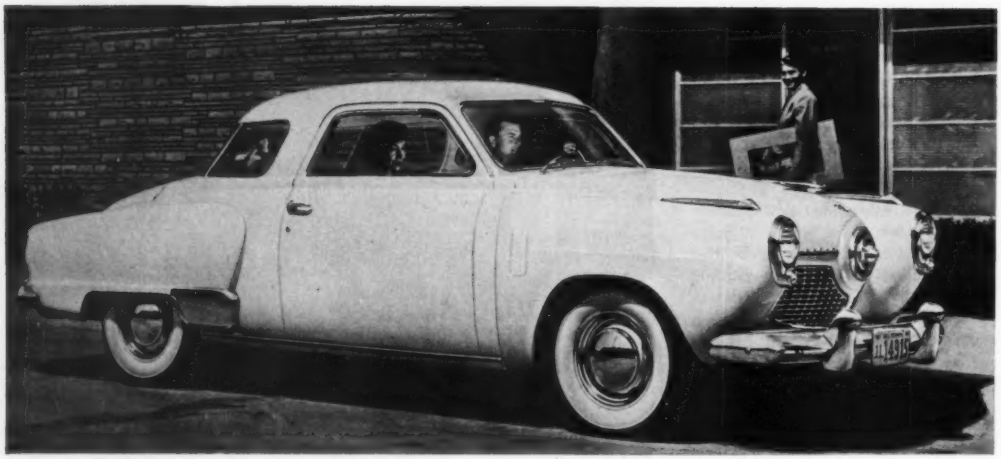


General view of 64-oz. press for molding T. V. window. Extruder unit below hopper uniformly pre-plasticizes molding material and feeds it into vertical injection chamber





Left: Mold, in open position, for 16-in. T. V. lens and bezel is mounted in press. One finished shot is in foreground. Right: Closed mold showing the control panel of the press. Molding cycle is less than 2 minutes. Completed piece has projected area of 240 sq. in.



Rear springs in the 1951 Studebaker have extruded polyethylene liners between the spring leaves instead of the oil-treated wood liners used on previous models of the same car

Polyethylene in Car Springs

Two automobile manufacturers have already adopted polyethylene spring liners which eliminate squeaks, seal out dirt and grit, and maintain alignment for the life of the spring.

AUTOMOBILE manufacturers have long been searching for a spring liner material which will be quiet in operation, durable, and economical. Conventional spring liner materials (such as wax-impregnated paper, oil-treated wood, etc.) have their drawbacks. The most recently adopted material, and the most satisfactory, is polyethylene.

Polyethylene spring liners, called Plastaligners, were developed and patented by Spring Perch Co., Lackawanna, N. Y., which has been manufacturing spring steel products for over a hundred years. Plastaligners are currently being used on the 1951 Studebaker and on the 1951 Hudson.

Other manufacturers have been prevented from adopting the polyethylene liners only by shortages of the material. It is estimated that the postwar market for this single application could consume over ¼ million lb. of polyethylene per month.

The rear spring in the 1951 Studebaker is a four-leaf spring which contains Plastaligners 44 in., 30 in., and 18 in. long. Each liner is an extruded strip 2½ in. wide and 0.020 in. thick. It has a cross-section like an elongated I. That is, the liner has built-in flanges which fit around the edges of the spring leaves.

Flanges Seal Out Dirt

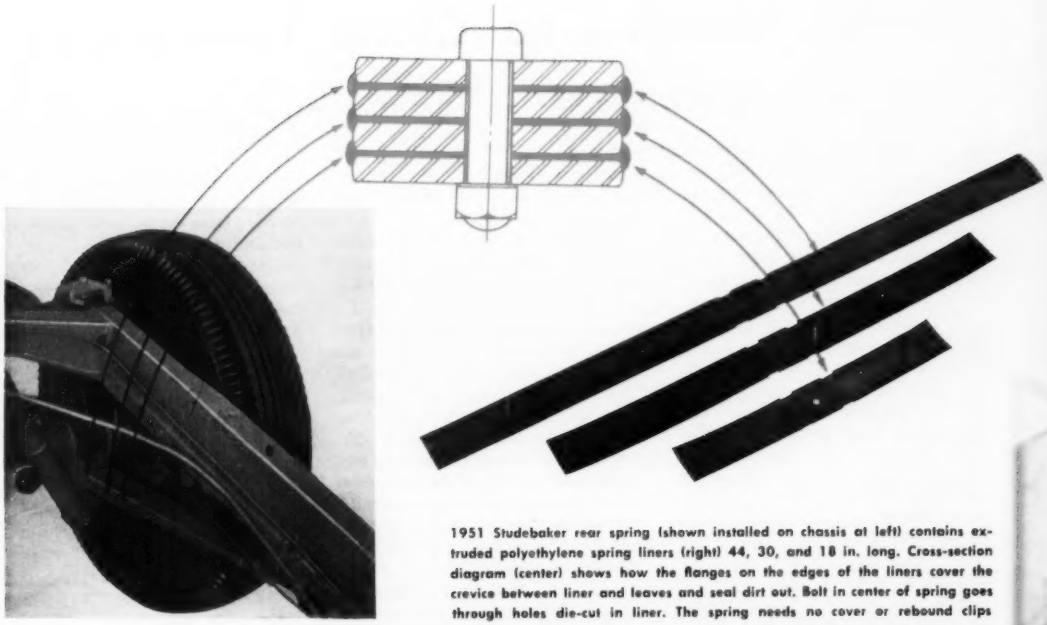
These flanges serve a number of purposes. First of all, they simplify assembly because the liners can easily be positioned in alignment with the leaves. Secondly, the flanges keep the spring assembly in permanent alignment. Thirdly, the flanges, which run the full length of the liner, seal the space between the leaves and the liner. This prevents dirt and grit from getting in between the spring leaves and causing disintegration of the liners. This is important because the dirt—and the wear caused by dirt—is a major cause of the breakdown of conventional springs.

Because the flange of the Plastaligner keeps the leaves in alignment, rebound clips can be eliminated from the spring. The fact that the flange seals out dirt eliminates the need for spring covers. Thus, although the polyethylene liner itself costs more than the liner materials it replaces, the elimination of rebound clips results in a net reduction in the over-all cost of the spring.

The polyethylene liner is also much quieter in operation because its waxy surface is self-lubricating. This feature is unchanged and the liner is unharmed by the extremes of heat and cold to which a spring is likely to be subjected.

Another cause of the degradation of spring liners such as wax-impregnated paper is the absorption of moisture. The polyethylene liner does not absorb moisture and is unaffected by salt or other chemicals used to melt ice and snow.

The springs for the 1951 Studebaker are supplied to Studebaker Corp. by Eaton Mfg. Co., Detroit, Mich. The Plastaligners for the springs are supplied to Eaton by Spring Perch Co. They are extruded



1951 Studebaker rear spring (shown installed on chassis at left) contains extruded polyethylene spring liners (right) 44, 30, and 18 in. long. Cross-section diagram (center) shows how the flanges on the edges of the liners cover the crevice between liner and leaves and seal dirt out. Bolt in center of spring goes through holes die-cut in liner. The spring needs no cover or rebound clips

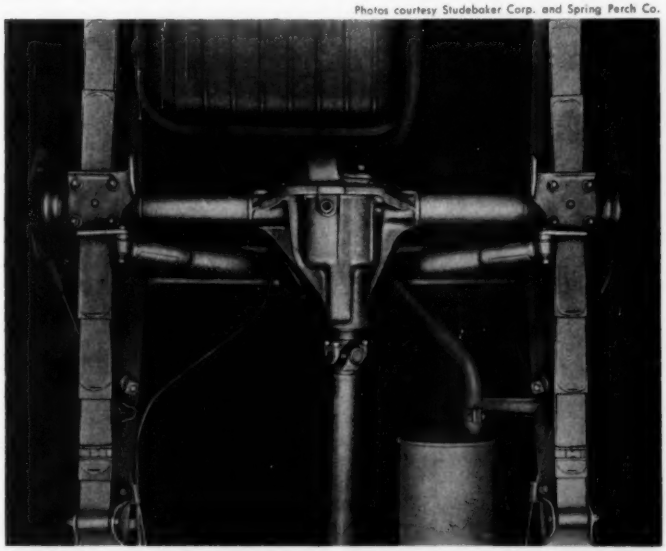
Photos courtesy Studebaker Corp. and Spring Perch Co.

by The Plax Corp., Hartford, Conn., and by Detroit Macoid Corp., Detroit, Mich.

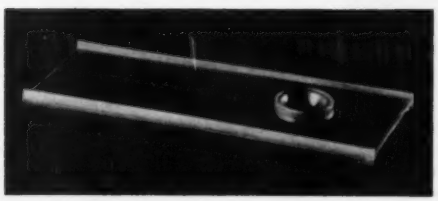
After extrusion, the liners are cut to length, and holes to accommodate the assembly bolt are die-cut in the center of each piece. A section of the flange is also notched out to leave room for the assembly clip.

Molded Partial Liner

The Plastaligner used in the 1951 Hudson is a partial liner. A polyethylene piece about 5 in. long is placed between the spring leaves at each end of the spring. This liner has the same I-shaped cross section as the extruded liner, but is injection molded so that a round positioning socket can be built-in on one side of the liner. Six of these liners are used in each spring. They are molded by Hake Mfg. Co., Inc., Depew, N. Y.



View of Studebaker rear springs from the under side shows how the square-ended spring liners project beyond the rounded ends of the spring leaves



Molded partial liner for 1951 Hudson is 5 in. long, has molded-in boss which holds it in place. Six of these are used per spring, and no liner is employed for remainder of the length of leaves

Holes Molded to Close Tolerances

by W. M. HOYT, JR.,* and F. REED ESTABROOK, JR.†

THE control panel of an IBM electric accounting machine tells the machine what to do. This panel is a plate made of an insulating material and containing a multiplicity of accurately spaced holes into which brass plugs are inserted.

Until recently these control panels have all been made from a fine grade linen phenolic laminate, with the holes drilled. The usual number of holes was 640 in a panel approximately 5 by 10 by 3/8 in., with two or three panels required per machine. However, with the development of the latest IBM accounting machine, Model 407, four control panels each approximately twice the size of the former and having 1280 holes were needed. Due to the high material and drilling cost of a panel of this type, it was decided to investigate the feasibility of producing this panel from molded phenolic.

Bakelite BM 120 Black was selected for the application because of requirements for uniformity, stiffness, heat resistance, abrasion resistance, and dimensional stability. There was also a requirement that the panel material should not abrade the brass plugs.

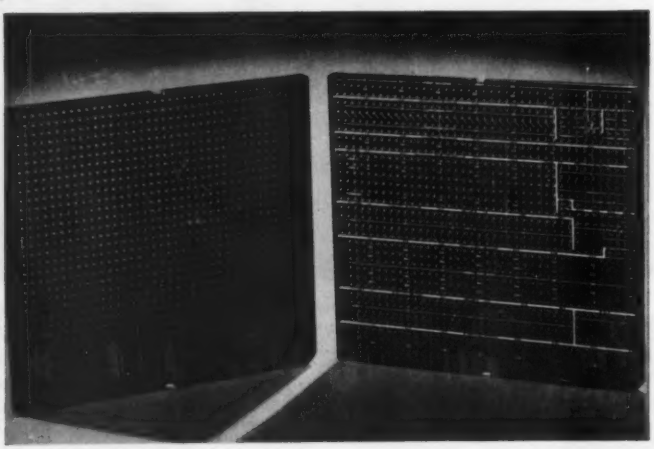
The part was drawn up and submitted to various molders for their comments on practicability of design. The main problems were 1) control of molding shrinkage within ± 0.007 in a maximum of 5 in.; 2) control of flatness; and 3) control of flash in the holes so that finishing costs would not be excessive. The molder was also faced with the problem of building his mold as accurately as possible, since variations in pin location in the mold would only add to the problem of keeping hole location in the molding within specified tolerances.

Northern Industrial Chemical Corp. was finally selected as the molder on the basis of its proposed mold design. Basically, the mold is designed as a stripper plate mold with butt-type pins. The mold plates were jig bored. Vega air-hardening steel was selected for the plates. The mold was built by Special Tool & Machine Co., Boston, Mass.

After only a moderate amount of experimental work the molder was able to develop a molding technique which would produce parts to specification, and to date approximately 20,000 pieces have been produced and accepted.

After the part is received by IBM, it is inspected for dimensions and then given a light sand blast before shipment to Photo Chemical Products, Inc., Long Island City, N. Y., for addition of circuit information marking. The procedure used is first to spray the molding with a coat of black baking synthetic enamel. The baked part is then printed with a white baking enamel using a phosphor bronze cloth photographic printing stencil. A final varnishing gives an abrasion resistant surface.

* Manager, Plastics Laboratory, International Business Machines Corp., Endicott, N. Y.
† Vice president, Northern Industrial Chemical Co., South Boston, Mass.



Phenolic control panel, before and after printing. By cooperative planning, these molded panels are produced at low cost and better than commercially acceptable quality

Tolerances Achieved

Although experience with the molded control panels has been relatively limited as compared with the hundreds of thousands of laminated panels used, the molded panel has given enough indication of being acceptable for the application so that a mold for the smaller panel, which is used in larger quantities, is now under construction. The cost of the molded panel is approximately one-third that of a similar laminated panel. Although it is desirable to hold the location of the holes to closer tolerance than can be done in molding (the tolerance on the location of the drilled holes in the laminated panels is ± 0.003), it is felt that this difference is compensated by the closer tolerance on the diameter of a molded hole (± 0.002-0.000 on 0.157 diameter) as compared with that of a drilled hole (± 0.003-0.000), plus the fact that there is less change in the molded panel in service caused by atmospheric changes.

This application has been of interest because it has demonstrated that by proper cooperation between the molder and the user, by consideration in advance of mold design of all the molding problems that will be encountered, and by application of molding skill, it is practical to produce, at a reasonable price, molded parts which surpass commercially accepted quality standards.

'Plastics Shape the Future'

Abstracts of papers presented at the Seventh Annual National Technical Conference of the S.P.E.

AN integrated program of technical papers bolstered the theme "Plastics Shape the Future," adopted for the Seventh Annual National Technical Conference of the S.P.E., held Jan. 18 to 20 in New York, N.Y. The conference was sponsored jointly by the New York and Newark sections of S.P.E. Abstracts of the technical papers are presented below.

Underwriters' Laboratories' Viewpoint on the Use of Plastics

Karl S. Geiges, Underwriters' Laboratories, Inc., New York, N. Y.

The application of plastics in equipment listed by U. L. is of concern both from the standpoint of mechanical and electrical properties for doing the job at hand, and also from the standpoint of flammability which, in general, should be kept to a low level for minimum fire hazard. There is also a new problem which was largely introduced by the development of thermoplastics; namely, the effect of softening under moderate amounts of heating. These two features cover the primary interest of U. L. engineers in plastic applications. The relationship of materials that have balancing characteristics has received considerable attention which, in turn, has been responsible for recognition of the new plastics as having special and highly desirable characteristics.

Properties, Applications, and Processing of Rigid Vinyls

C. E. Parks, B. F. Goodrich Chemical Co., Cleveland, Ohio

High molecular weight polyvinyl chloride has excellent properties for rigid thermoplastic applications, but is generally considered to be too difficult to process. This paper reviewed the early attempts to correct the processing difficulties by adding small amounts of plasticizer and the present data to show that this causes a significant loss in physical properties. Also included in this survey was a discussion of low molecular weight copolymer resins which can be processed without plasticizer.

A new high molecular weight polyvinyl chloride resin was described which has much wider application possibilities because of its added toughness and higher temperature softening point. This resin can be processed satisfactorily on conventional equipment without the aid of plasticizers. Several applications were suggested which require the good physical and chemical properties of a high molecular weight unplasticized polyvinyl chloride plastic.

Plastisol Molding

C. W. Patton, Union Carbide and Carbon Corp., New York, N. Y.

The plastisols provide a new approach to the molding of elastomeric vinyl compounds. First developed in 1944, they have found commercial application for numerous specialty molding jobs where their ability to be molded without pressure (as in slush molding), to be injected without damaging or disarranging delicate inserts, to fill long molds without weld marks or strains, or to tolerate higher filler proportions, is important.

One interesting specialty use is in the manufacture of phosphorescent articles. Compounding phosphorescent pigments in vinyl resins normally necessitates hot milling, which damages the crystals of these sensitive pigments and detracts from brilliance of the phosphorescence. Because of the fluidity of the plastisols, the phosphorescent pigments can be stirred in without milling and then molded, without impairing the effectiveness of the pigment. Other uses of plastisols include repair pastes for vinyl resin insulated wire, prosthetic appliances, and special types of sealing and gasketing materials.

Designing Better Plastics Products

Carl W. Sundberg, Sundberg-Ferar, Detroit, Mich.

The plastics industry has become design conscious. No other materials adapt themselves so well to attractive modern shapes. At the same time, plastics are ideal production materials since even the most intricate and complicated forms may be readily reproduced in unlimited number quickly and at low cost.

There are many different plastics and plastics processing techniques. The designer must be familiar with them all and be able to select the proper material and process for each individual job. The physical characteristics of the plastics materials are important, but so, too, are such considerations as material costs, adaptability to available manufacturing equipment, and, of course, appearance and style. The design of a product is to some extent limited by the plastic mold and by the finishing equipment at hand. All such factors must be evaluated before a final design can be successfully evolved.

Masking Problems in Manual and Automatic Spray Painting of Molded Plastic Parts

Hamilton E. MacArthur, Conforming Matrix Corp., Toledo, Ohio

The paper reviewed long established masking practices using tape, die-cut adhesives, silk screening, hot stamping, printing, rolling, and hand-worked sheet-metal masks. Metal masks used in spray painting decoration—both fabricated and electroformed—were also discussed.

(*Continued on p. 169*)

Lamp Sockets

All photos courtesy B. F. Goodrich Chemical Co.

Over-all view of plant for precision dipping of lamp sockets in vinyl plastisol. Installation is one of three having total capacity estimated to be capable of supplying a substantial portion of the automotive industry's requirements for such specialized equipment

BY dipping lamp sockets for automobile parking lights and tail lights into a vinyl plastisol, under controlled operating conditions, a complete assembly is obtained which promises to eliminate all future troubles caused by the penetration of moisture and dust into socket assemblies. In the past, a number of methods have been tried to attain the same end. Protective boots, gaskets, hoods, grommets, etc., have all been employed. However, the desired objective of effective sealing against dust and moisture had not been obtained until the new vinyl sealing process was developed.

The plastic sealing method which satisfies all the requirements of the automotive industry has been perfected by Watts Electric & Manufacturing Co., Birmingham, Mich., original equipment supplier of sockets to car and lamp manufacturers.

Moisture Sealed Out

The vinyl plastisol-dipped socket assembly has proved to be water tight, dust proof, lower in cost, and especially resistant to age and weathering. Because of the single unit construction of sealing component and socket, moisture and air are effectively sealed out, and the costly, multiple-step production and installation of ineffective lamp protectors is eliminated.

The development of the new type socket was made possible by the adaptability of a Geon plastisol—custom formulated by the Chemical Div., Michigan Chrome and Chemical Co., Detroit, Mich.—to a unique dipping technique developed by Watts and on which patents have been applied for. This process employs a combination dipping machine, which is, at the same time, a production line. The vinyl component is so designed and processed that it serves a dual purpose; it forms a protective coating and also becomes an integral and functional component which changes the whole character, shape, and function of the metal lamp socket.

Plastisols based on Geon paste resin, a product of B. F. Goodrich Chemical Co., Cleveland, Ohio, have markedly influenced the dip coating industry. Through controlled compounding of the paste resin, it is possible to vary the flow properties of an unfused plastisol, as well as the performance characteristics of the completely fused product.

A Single Dip

With a plastisol it was possible for Watts to obtain its required pick-up weight with just a single dip.

In final stage of dipping cycle, dipped sockets are inspected as they come out of a refrigerated coolant bath. Accepted sockets are then ready for packing

Sealed With Vinyl

Through control of compound viscosity, temperature of the socket assembly prior to dipping, and the speed of dipping and withdrawal, a coating is obtained that adheres tightly to metal and possesses excellent water, chemical, and abrasion resistance.

The precision dipping machine is one of three now in operation which together can dip 280,000 units in a 24-hr. period. This capacity is estimated to equal a substantial portion of the requirements of the automotive industry for socket assemblies of selected types.

The machine is a 70-ft. unit, custom made, with preheating oven, dipping bath, fusion oven, and liquid cooling bath through which pass 550 specially designed arbors affixed to an extended roller-type chain which moves continuously down the processing line. A socket is placed on each arbor, thereby creating an assembly which is then preheated. The preheated assembly causes a gel-layer to form on its surface after dipping, that layer in turn picking up additional liquid plastisol. By control of the preheating temperature, a pre-determined and precise coating thickness can be maintained.

After preheating, the socket, assembled to the specially designed arbor, is immersed in the plastisol bath. A unique storage and piping device keeps the plastisol at a uniform level and in uniform condition at all times, resulting in precision dipping with little or no variance in dimensional tolerances.

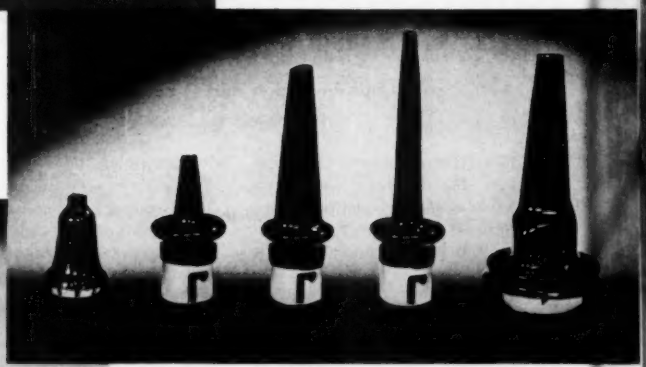
After dipping, the coated socket assembly moves into a long fusion oven containing banks of infra-red lights. After oven curing, the assembly moves continuously through a refrigerated coolant bath after which it is automatically ejected ready for inspection and packing.

Steps Eliminated

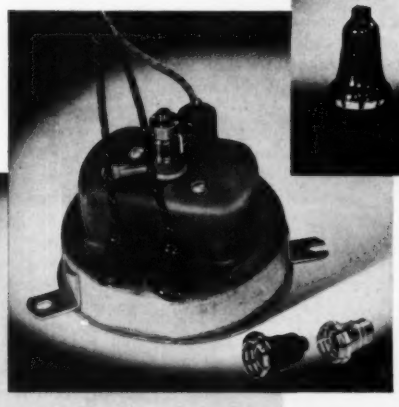
The end result obtained in the single dipping operation is equal to that achieved in three and four steps in the production and assembly of conventional socket assemblies and entirely eliminates the need for multiple operations. This in itself gives a substantial saving. The rapid production rate of the dipping machine, coupled with the smooth, uniform component produced, makes the process a technological advance that opens the way for a variety of new and hitherto impossible and impractical plastisol-dipped industrial and consumer products.

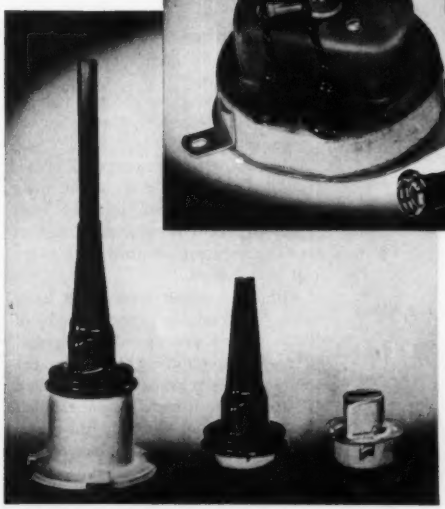
By simply changing arbors, Watts can dip any small automotive, electrical, or mechanical parts that require either a protective coating, a functional component, or both.

In the automotive field alone, such products as ignition coils, body harness clips, ordnance and aircraft connectors and sockets, ignition equipment, and battery and ground straps lend themselves to this new dipping technique.



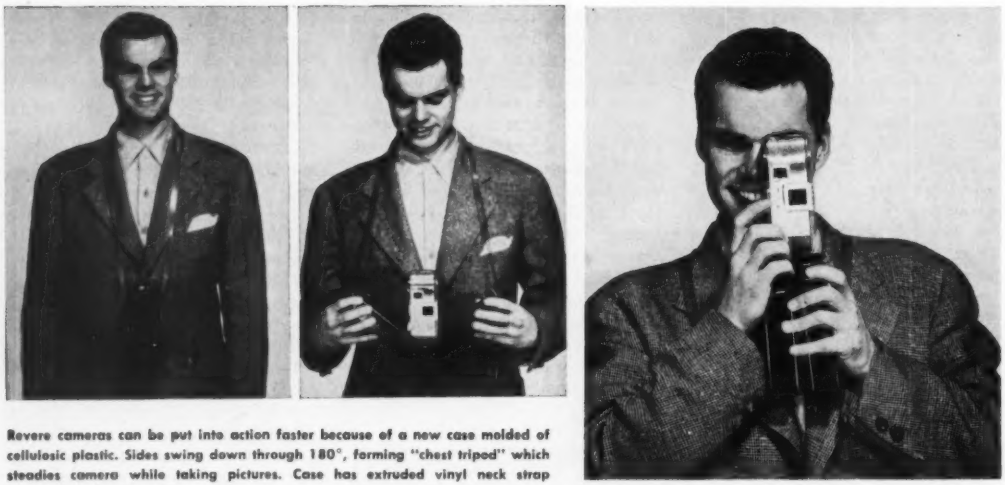
Right: Among the vinyl-dipped sockets made for automotive use by the new process is this array, including an instrument panel socket, left, and varied license and parking lamp sockets





Above: Rear of speedometer showing instrument panel socket assembled. In front are dipped (left) and undipped (right) sockets

Left: Parking lamp socket in various assembly stages. Complete installation is at left; center—dipped socket alone; at right is undipped unit.



Revere cameras can be put into action faster because of a new case molded of cellulosic plastic. Sides swing down through 180°, forming "chest tripod" which steadies camera while taking pictures. Case has extruded vinyl neck strap

Multi-Function Molded Camera Cases

Unusual design makes carrying case versatile, picture-taking easier

WHEN Revere Camera Co., Chicago, Ill., recently announced production of molded carrying cases for two of its 8-mm. movie cameras, it was simply taking another forward step in the application of plastics to the camera industry. As reported on p. 133, January 1950 MODERN PLASTICS, Revere made use of the properties of plastic in 1949 in a smartly styled "slip-over" projector case designed as a basic component of the projector rather than as an accessory. This projector case, formed of a copolymer sheet material, latched directly to a molded phenolic base on the projector. The whole design quickly established a new concept of projector case styling and utility.

Revere's latest plastics application combines the advantages of the injection molding process with a design which makes the case multi-functional. Not only does the case thoroughly protect the camera against mechanical damage and the effects of weather, but it also forms a "chest tripod" which steadies the camera while taking pictures. The "chest tripod" function is achieved by a design which permits the two sides of the case to open sidewards and then down through 180° on two hinges.

Currently being molded of Forticel (cellulose propionate)[1] in a rich walnut mottle color, the case is being produced in two styles to fit the company's models 55 and B-61 8-mm. movie cameras. The cases were developed under direction of Frank C. Lustig, Revere's chief engineer, with the cooperation of Victory Mfg. Co., Chicago, which handles both the molding and assembly of the two products.

Vinyl Neck Straps

Basically similar in construction and operation, the two cases are equipped with embossed vinyl neck straps supplied by Anesite Co., Chicago. Each case closely follows the contours of the camera for which it was designed, with the B-61 model having a projecting portion in front to accommodate the lens assembly. On the Model 55 camera, which features a recessed lens with a new "iris-scene" device for automatically blending scenes together, no additional lens space is required in the carrying case.

In developing the new type swing-away cases, Revere sought a multi-purpose accessory which would not only provide the desired protection for the cameras, but would also maintain the company's reputation for quality merchandise and would enable the camera to be brought into action without delay. Movie camera fans want to be able to capture a shot on the spur of the moment—before it gets away. With some types of cases, it is necessary to remove the camera completely and then put the case down—or let it hang awkwardly on its carrying strap—before the camera can be operated.

Although action-type cases have been successfully constructed of leather, they are usually composed of several sections which snap together and are somewhat awkward to use. With Revere's new molded plastic case, not only do the sides swing down completely out of the way of the camera but they also form a secure support which can be rested

[1]Editor's Note: As noted on p. 62, January 1951 MODERN PLASTICS, production of Forticel was discontinued in 1950, because the manufacturer is convinced that other hard formulations of acetate have been developed which can do practically the same jobs. At the time of writing, the Revere camera cases are still being molded from accumulated stocks of Forticel, but it is reported that the job will be switched to another impact-resistant cellulosic when present stocks are exhausted.

against the body to prevent camera movement and insure steadier movies.

This unusual action feature of the plastic cases is made possible by their unique three-piece construction. These include the exceptionally rigid base, to which the bottom of the camera fastens by means of a captive bolt screwing into the tripod socket, and the two sides, which have a tongue-and-groove edge fit and are hinged to the base so that they can be swung through 180° in a vertical plane. This exceptional hinge travel is attained by designing the case sides with slots in the bottom. Alinement of the bottom section when the case is closed is insured by internal stops on the sides which come up against it.

With this ingenious case construction, it is possible even to load the cameras without removing them from their cases. If desired, however—for example, when the user wishes to place the camera on a tripod—the case can be taken off in a few seconds merely by loosening the screw at the bottom of the case.

Smart modern styling, with tasteful use of fluting, keys the cases closely to the appearance of the die-cast camera bodies. The Revere name is molded in relief on both halves of each case, running vertically on the Model 55 and horizontally on the B-61. Letters are topped with gold ink for greater contrast. Since the inside of the case is plainly seen when the camera is operated, the finish on the inner surface was made equal to that on the outside of the case.

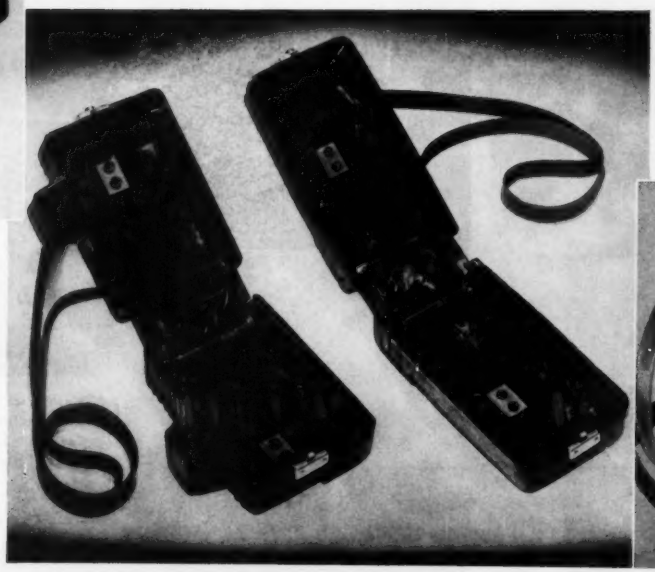
Family Molds Used

Through the use of cellulose propionate, Revere obtains a brilliant surface finish directly from the mold, along with great toughness to withstand normal service abuse. For each of the cases, a three-cavity family mold which runs on a 9-oz. HPM press is used. Considerable development work was required on the first case—the Model 55—to overcome undesirable weld lines and related problems. The solutions involved proper gate location and varying wall sections to achieve the desired flow pattern. This experience proved invaluable in the course of tooling up for the B-61 case.

The molder handles all assembly operations on the bases on a production-line basis, a moving conveyor belt carrying the components to successive operators. The program is so set up that a changeover from one case style to the other can be made quickly merely by changing fixtures on drills, painting masks, etc.

After gold ink has been rolled onto the "Revere" name and dried, case halves move through the assembly line in pairs. Multiple spindle drills speed operations in drilling holes for the brass latches and hinge pins. The vinyl straps are slipped through molded grooves in the case sides and anchored in place by an air-operated heated tool which flattens the cored studs. After cases are assembled and latches riveted in place, they are inspected and wrapped in tissue before being boxed for shipment to Revere, where the captive bolt is inserted in the bottom platform.

Camera buyers were prompt to show their approval of the new cases. Although the cameras may be purchased with or without the case, experience to date indicates that by far the majority of customers purchase the case at the same time they buy a camera.



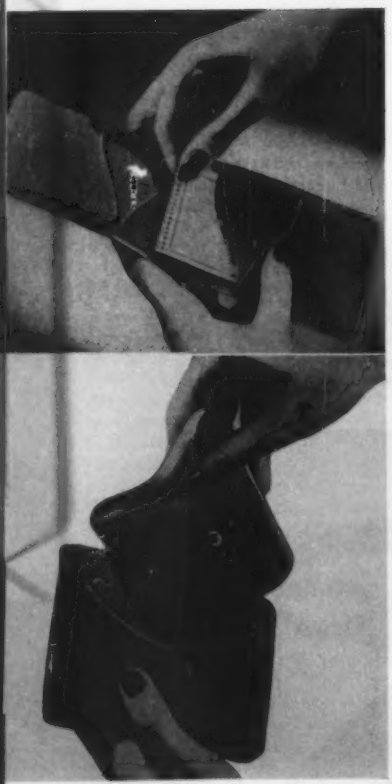
Left: Case of model B-61 camera is designed with projecting front to accommodate camera lens assembly. Right: Case for model 55. Center: View of both cases, partially opened, showing three molded parts. Important details include cored opening, through which captive bolt screws into camera tripod socket; heat-sealed cored studs which anchor neck straps; and tongue-and-groove fit between case halves

Vinyl With

Handbag and matching belt with appearance of needlework are made by Harry Litwin, N.Y., of Forrest Process formed vinyl sheeting

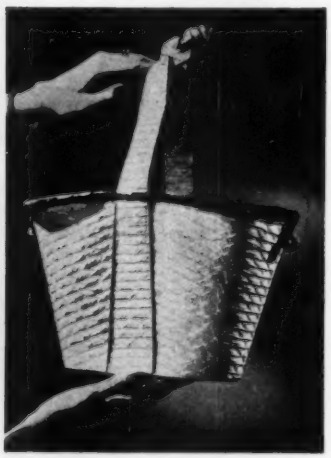
A NUMBER of recently developed surface effects in Vinylite film and sheeting have improved the appearance, feel, and styling of the material and have thus made it even more acceptable for use in home decoration. The new film and sheet materials and some of the end products fabricated of them were shown recently by Bakelite Div., Union Carbide and Carbon Corp.

The new materials include: 1) a new light-gage line of Sealtuft stitchless quilted vinyl in new patterns and colors made by The Jason Corp., Hoboken, N.J.; 2) Coryl, a formed calendered film made by The Decora Corp., Fort Edward, N.Y.; 3)



Stitchless wallets in various colors and surface effects are made of Forrest Process formed sheeting by Aristocrat Fifth Avenue, New York. Straw, corded, and woven ribbon are among patterns

Hedwin formed vinyl sheeting gives handbags made by Markay, Inc., New York, appearance of leather, needlework, or fabric. Crown Jewel design (left) and corde on calf (below left) are examples



Woven straw (above) is one of the patterns available in handbags made by Gaybrand Bag Co., New York, with Forrest Process formed vinyl sheeting

deep embossed sheeting produced by Hedwin Corp., Baltimore, Md., and by The Forrest Process & Development Corp., New York, N.Y.; 4) a laminated film with a sealed-in print made by Victory Plastics & Embossing Corp., Brooklyn, N.Y.

The new Sealtuft material consists of a 12-gage textured Vinylite sheet electronically sealed to a clear 4-gage film backsheet with a fire-resistant cellulose padding between the two sheets. The material is lighter in weight and considerably less costly than the original Sealtuft.[1] It comes in 16 special colors and 5 patterns.

Coryl, the formed film material, is made by a process which differs from embossing in that the pattern is formed into the full thickness of the material instead of being impressed on the top surface only. This makes possible greater depth of texture, makes the material practically crease- and wrinkle-proof, and eliminates curling at the edges. Various patterns are available, some of which combine printing with the forming to create special effects, such as a Glen plaid.

Three-dimensional effects are even more marked in the molded sheeting produced by Hedwin and by Forrest Process & Development. Undercuts can be produced to help simulate such surfaces as hemp, woven straw, beads, etc. The molded Vinylite sheeting can be used for table mats, handbags, wallets, slippers, etc.

The material made by Victory Plastics is produced by laminating a layer of clear transparent film over another film on which a color or pattern has been printed. Simultaneously, an embossed fabric finish is applied to the surface of the transparent film. The layer of clear film protects the printing against wear and makes it possible to heat seal the material. Unprotected printed film cannot be heat sealed with present techniques.

[1] "Stitchless Quilted Vinyl," MODERN PLASTICS *26*, 98 (Nov. 1948). "New Patterns in Stitchless Quilted Vinyl," MODERN PLASTICS *27*, 62 (Aug. 1950).

New Surface Effects

All photos courtesy Bakelite Div.

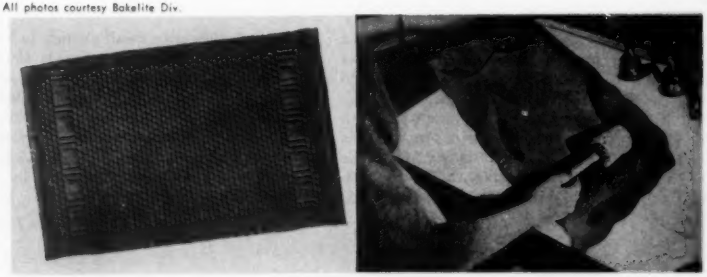
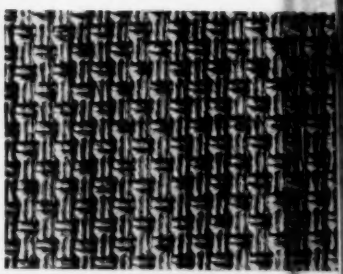


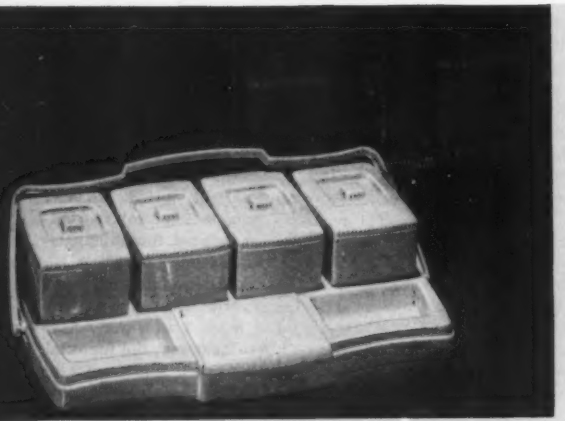
Table mats made by Hedwin Corp. are formed vinyl sheeting with three-dimensional surface patterns. Tulip design applied on realistic linen background and woven ribbon are among patterns



Close-up of Coryl formed film shows how surface resembles woven fabric

New light-gage Sealtuft consists of 7-mil vinyl film electronically sealed to 4-mil back sheet through cellulose padding. Front film is embossed in various patterns such as Block (left), and wire-like Twist

Printing combined with forming give Coryl film fabric-like look



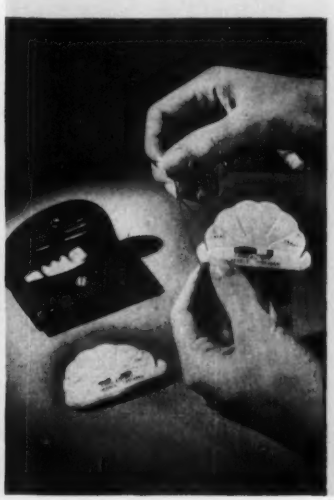
Baby accessory tray and containers for cotton, boric acid, baby oil, etc., are molded of styrene. The unit, recently redesigned by Gerald Stahl Associates, has a hinged soap compartment and a convenient carrying handle which folds out of the way when not in use. Tray and the removable containers are molded of blue, pink, or white. Containers are also available separately. Made by Clarolyte Corp., 65 W. 36th St., New York, N. Y.

PLASTICS

Cowboy belt is extruded of clear vinyl and has two-color design, including half-tones of Gene Autry, printed on the back by rotogravure process. The designs take on an attractive depth when seen through the clear vinyl belt. The same process is used to print a stylized leaf-like pattern on belts. The belts are made in black and white and in brown and beige, in sizes from 20 to 30, by M. Slifka & Sons, Inc., 275 Seventh Ave., New York, N. Y.

Young fans of Howdy Doody, puppet television star, can have a model of their favorite molded of Tenite II cellulose acetate butyrate. Model is clad like the original and has a mouth which moves when string in back is pulled. Made in 20 and 24-in. sizes by Ideal Novelty & Toy Co., 184-10 Jamaica Ave., Hollis, N. Y.

Needle threader small enough to be carried in purse has separate slots for small needles (sizes 6, 7, 8) and large ones (3, 4, 5). The unit, called the Thread-Zit, is molded of styrene. It is supplied, complete with needles and thread, in a purse-size kit. Made by Cotter Products Inc., 103 Fifth Ave., New York, N. Y.



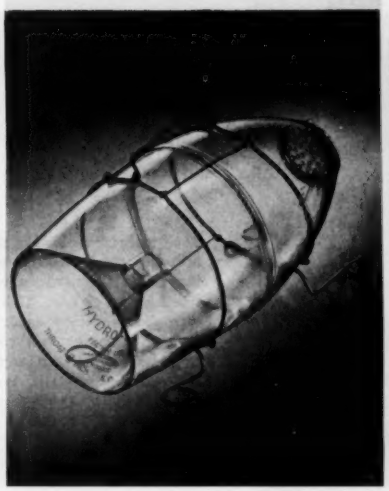
Vinyl vacuum seal fits all smooth-edged cans, jars, and glasses within a wide size range. The cover, called the Univac, is made of translucent natural-colored 6-gage vinyl film heat-sealed between the parts of a double rim molded of red vinyl. Made by C & S Engineering Co., 560 Old La Honda Rd., Woodside, Calif., and distributed by Bart-Kinnison Co., 1355 Market St., San Francisco, Calif.

PRODUCTS

Handbags and other bulky items can be stored easily in the Sto-Away Shelf Bag, which has built-in shelves to hold such items. The bag is made of Velon vinyl film and has a zipper closure. The bag is made by Jayhawk Mfg. Co., 286 Fifth Ave., New York, N. Y.

The torpedo-shaped Hydro-Jet minnow trap is molded of transparent Tenite II cellulose acetate butyrate. A wire frame serves as a carrying handle or provides the trap with four steady feet. The butyrate trap is light in weight, durable, and corrosion-proof. It is molded by Fairfax Plastic Molders, Inc., P. O. Box 142, Kansas City 17, Kan., for Fairfax Engineering Co., located at the same address.

Unusually compact deodorizer which looks like an electric plug is molded of brown phenolic. Deodorant wafers which fit into a hole in the bottom of the unit give off a deodorizing essence when heated by a heating element built into the plug. The unit, called the Odor-Master, operates on AC or DC and has UL approval. Cost of operation is estimated at 1¢ a week. Each wafer lasts 100 hours. Made by Electric Deodorizer Corp., 2903 Broadstreet, Detroit 4, Mich.



Tunes can be played on set of bicycle horns known as the Melodee Trio. Horns are molded of Tenite I cellulose acetate in red, white, and blue. They have rubber bulbs and are mounted in echelon on an extruded acetate bar. The bicycle horns are manufactured by Waljohn Plastics, Inc., 437 88th St., Brooklyn, N. Y.

Handy lubricator called the Oilette has a shatterproof barrel of clear transparent Tenite I cellulose acetate. Metal oiling tube operates in oil holes up to ¾ in. deep. Transparency of the barrel makes the oil level visible. Barrel is molded by Quinn-Berry Corp., Erie, Pa., for Malko-Wortell, Inc., 3524 N. Halsted St., Chicago 13, Ill.

Desk lamp has molded phenolic shade which prevents glare because of its small diameter (3¾ in.) and its 6-in. depth. Direction of the concentrated beam of light can be altered by moving the shade, which is attached to the brass upright by a ball and socket joint. Made by Rand Products Co., 672 Courtlandt Ave., New York 51, N. Y.

PLASTICS

Food warmer molded of urea gets its heat from a candle, can thus be used to keep coffee or food warm on the porch, the terrace, the coffee table, or in other locations where there is no electrical outlet handy. Holes in the bottom of the urea base provide the necessary draft to allow the candle to burn. The base is heat resistant and can be used on tablecloths or polished wood tables without any tile or hot pad. The top of the unit is an aluminum grill. Warmer made in ivory or red by Beacon Plastic & Metal Products, Inc., 280 Madison Ave., New York, N. Y.

Portable hassock for use as a television seat is made of Vinylite film. The seat can easily be inflated for use or deflated for compact storage. It is 16 in. in diameter by 11 in. high and is decorated with cowboy or circus designs. It is fabricated by Plastictronics, Inc., 54 Greene St., New York, N. Y.

Light-weight, easily portable modern folding chair has wood frame and Lumite woven saran seat and back. The frame is blond fir finished with waterproof spar varnish. The easily washable saran seat and back are available in colorful plaids and other patterns. The chair is made by Ficks Reed Co., 305 E. 63rd St., New York, N. Y.

Non-breakable drying frame for sweaters has steel cores covered with Vinylite resin. The dryer is adjustable for sweaters from size 32 to 44 by merely pushing or pulling, and the wire tension holds the shape without locks or springs. Similar sock dryers are available. Manufactured by Queen Mfg. Co., 4227 Lake St., Chicago 24, Ill.

PRODUCTS

Compartmented 14-in. diameter tray molded of Melmac can be used as an hors d'oeuvre tray or in place of other dishes when eating buffet style. Available in the same colors as the line of Lifetime Ware melamine dishes made by the same producer, Watertown Mfg. Co., Watertown, Conn.

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Latest Advances in Dry Coloring

Recent progress in this method of coloring styrene molding material gives new data on blending speeds and equipment, special effects, and available colorants

by SANFORD E. GLICK

WHEN dry coloring of styrene plastics was first introduced, it was felt that its scope of application was limited. At the start, only small items having relatively poor color dispersion and distribution were produced by this method. However, with the recent improvements made, the original restrictions no longer apply. Even during the short period of time in which dry coloring has been practiced, surprising strides have been made. Molders can now obtain exact color matches for a wide range of applications.

Utilizing a new styrene colorant blend molding compound, developed by Monsanto and tailored to the process, dry coloring will benefit the entire styrene molding industry. The 10% reduction in material cost is merely one of the many advantages derived from this process.

It is now possible to successfully dry color such styrene industrial parts as wall tile, television masks, vacuum cleaner parts, utensil handles, thermometer housings, various containers, lamp globes, clock cases, and electrical cord plugs. More recently, refrigerator white parts and air conditioning louvres have also been produced on a commercial basis by the dry color method. As more experience is gained with the various means of improving color fidelity and color dispersion, this method will expand until it will be suitable for the manufacture of almost all items. Certainly with the growing importance of the pre-plasticizing types of injection machines, the fields of application for dry coloring are fast becoming unlimited.

* Reg. U. S. Pat. Office.

Current Emphasis

Because dry coloring permits greater flexibility of operation with a lower inventory, the process is especially timely during the current period of mobilization when all plastics are being allocated. With the dry coloring process it is also possible to make most efficient use of current supply by reprocessing reground styrene plastics. Recoloring is achieved at the molding level, saving time, expense, and material.

Dry coloring is a fairly simple method of producing colored molding powder from virgin crystal styrene plastic. Its chief advantages are simplicity, economy, and efficiency in operation. Inventory requirements are substantially reduced since, with dry coloring, a variety of colors may be quickly obtained from the stock of crystal. One of the largest toy molders was able to reduce his inventory to one quarter of its original level by converting from processed colors to dry coloring crystals.

Exceptional brightness and luster are attained with dry coloring since only virgin material is used, and there is no degradation in processing. The method also permits redyeing and reworking scrap, suggesting new fields for colored plastic applications in lower cost items.

In Monsanto's first bulletin on dry coloring, blending for 20 to 30 min. at 15 to 30 r.p.m. was recommended for most satisfactory results. Since then, a considerable amount of work has been conducted on blending efficiency, and the original views have been modified.

For any of the end-over-end type blenders, the best results are obtained at 90% of the critical speed. (The critical speed is the speed at which centrifuging occurs.) End-over-end drum tumblers should be operated at 44 r.p.m. for best results. Above this level, the color disper-

THE AUTHOR

An early enthusiast for the dry coloring process dealt with in the accompanying article, Sanford E. Glick has been with Monsanto Chemical Co., Plastics Div., since his graduation from M.I.T. in 1941. In the course of his work, Mr. Glick has contributed to many of the improvements which have been made in the dry coloring process.

Now head of the Technical Service Dept. for Monsanto, Mr. Glick has served on the S.P.I. Wall Tile Committee and is also a member of the S.P.I. committee working on the revision of the Institute's handbook. For the past year Mr. Glick has been chairman of the S.P.E. committee on injection molding thermoplastics.

sion drops off as centrifuging is approached. Below 30 r.p.m., the blending is inefficient in that the material merely slides slowly around the sides of the blender, resulting in reduced color dispersion or distribution. In the 30- to 40-r.p.m. range, satisfactory coloring results, with the optimum reached at 44 r.p.m. Most of these results were obtained on 175-lb. drums. Smaller drums will take higher speeds while larger drums will require slower speeds.

Time Can Be Reduced

At the faster blending speeds recommended above, reduced blend cycles can be employed. Almost all colors can easily be blended in 5 to 20 min., the easier colors requiring shorter periods of time. Even for difficult colors, 75% of the dispersing of colors is performed in the first 10 minutes. Blend cycles used for a particular color must be kept constant, since variations may cause changes in shade.

The blender load is another important variable in obtaining satisfactory coloring. For the end-over-end type blenders, best results are produced when the containers are at 30 to 50% of capacity. Above this level, the material will not be tumbled efficiently. Accordingly, for 200-lb. drums, the load should be no greater than 100 pounds.

Information presented above concerns the end-over-end type blenders. Experience to date indicates that for best results in coloring as well as ease of handling and freedom from contamination, this type of blender is desirable. Nevertheless, other types of blenders such as drum rollers, concrete mixers, dough mixers, ribbon blenders, and other modifications have been used to good advantage. Optimum blend loading, speed, and time have not been determined for such blenders.

Colorants

Many different types of colorants are employed in the dry coloring operation.

Oil-Soluble Dyes—As a class, oil-soluble dyes are less stable to light and heat than inorganic pigments. Therefore, extreme care must be exercised in the selection of dyes to be certain that they have adequate stability. A sacrifice in trying to match a particular shade is preferable to use of an unstable colorant which might produce the more exact shade desired, but will cause excessive rejections due to color fading in molding or subsequent use.

Pigments—For the translucent and opaque formulations, a fairly wide range of colors in the spectrum range from yellow to red can be prepared from single cadmium colorants. To produce exact matches, suitable toners can be added.

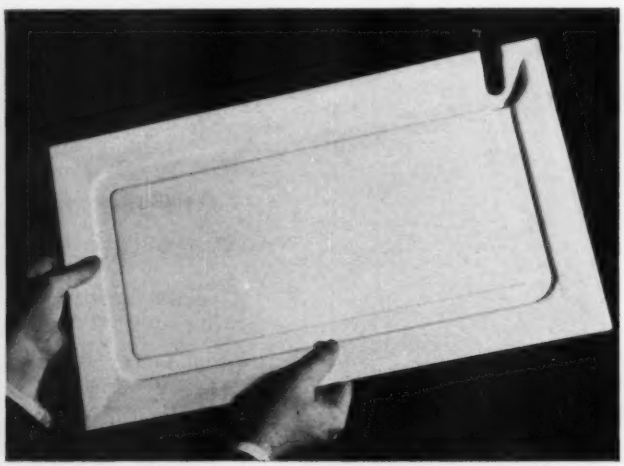
A number of companies[1] supply color formulations to match any color required. The colorants are already mixed, and in some instances receive special treatment to provide improved coloring and moldability. Also, some of the colorant processors offer the colorants weighed out in packages sufficient to color 100 lb. of crystals. This eliminates the possibility of color weighing errors on the part of the molder.

The colorant processors supply the colorants in a form which in a number of instances produces improved color dispersion, especially for those colorants composed of a number of ingredients. Another advantage in purchasing colorants from processors lies in reduced moisture susceptibility. Some untreated colorants are inclined to pick up moisture in humid weather. When mixed with the crystal styrene and molded, there is a chance that the wet colorants will produce silver streaks or splash marks in the molded pieces. Colorants purchased from some of the processors usually are treated to minimize moisture pickup and eliminate subsequent molding difficulty.

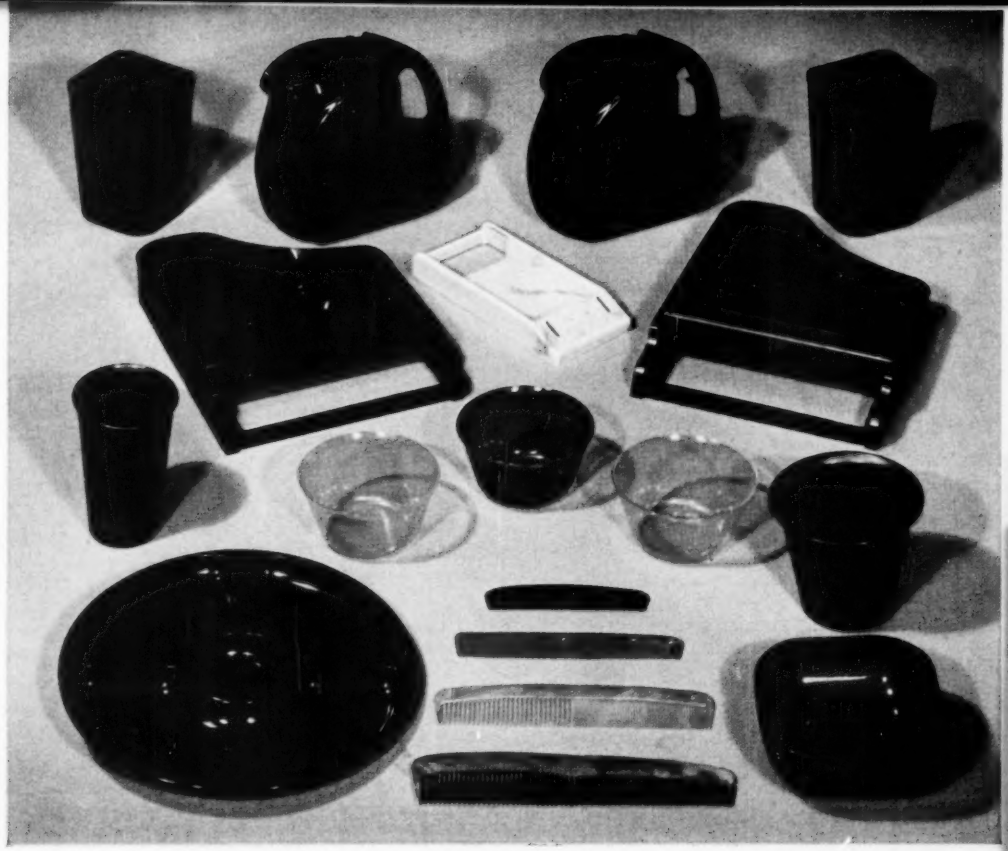
Painstaking care is exercised by the colorant processors to supply colorants which are particularly suited

[1] Molders may contact the following colorant processors for suitable color formulations: Ferro Enamel Corp., 4150 E. 56th St., Cleveland 5, O.; Krieger Color & Chemical Co., Inc., 6531 Santa Monica Blvd., Hollywood 38, Calif.; Gering Products, Inc., N. 7th & Monroe Ave., Kenilworth, N. J.; H. Kohnstamm & Co., Inc., 89 Park Place, New York 7, N. Y.; Claremont Pigment Dispersion Co., Inc., 110 Wallabout St., Brooklyn 11, N. Y.; H. Jamison Plastics, 71 E. Sunrise Highway, Freeport, N. Y.

Complete freedom from color streaking makes dry colored styrene suitable for lighting fixtures

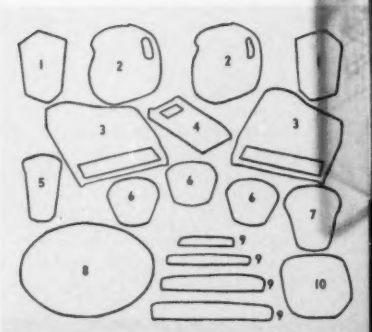


Dry colored styrene meets the exacting color demands of the refrigeration industry. The technique is applicable even to such large molded pieces as this drip baffle



All illustrations courtesy Monsanto Chemical Co.

Metallic, mottled, and fluorescent dry colored molding materials were used in producing the items shown in color above. Refer to key at right. 1) Copper and green metallic containers, by Nu-Plastics, Los Angeles, Calif.; 2) Red and blue metallic water pitchers, by Peerless Plastic Products, Inc., Montebello, Calif.; 3) Red and green metallic piano bodies, by Peerless Plastic Products, Inc.; 4) Mottled calender pad housing, by Brown & Bigelow, New York, N. Y.; 5) Copper metallic tumbler, by Rogers Plastics, Inc., West Warren, Mass.; 6) Fluorescent bowls, by Rogers Plastics, Inc.; 7) Copper metallic flower pot, by Rogers Plastics, Inc.; 8) Copper metallic picnic plate, by Alladin Plastics, Inc., Los Angeles, Calif.; 9) Combs, by Victory Button Co., Inc. Leominster, Mass.; 10) Red and green metallic bowls, by Burroughs, Los Angeles, Calif.



for the dry blending operation. Frequently, this requires completely new color formulations. With such formulations it is now possible for molders to color to close tolerances and obtain commercial matches. Undoubtedly, much of the recent progress in dry coloring is attributable to the important role played by the colorant processor.

Molding Aids

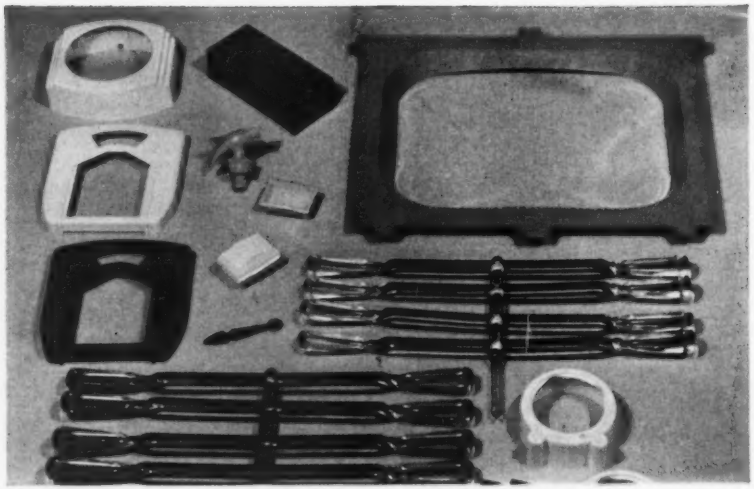
In reviewing the recent progress in dry coloring, strong emphasis should be placed on the use of proper die construction and the use of mixing disks or nozzles. With these aids, color fidelity is vastly improved, and items of the highest quality can be produced on a large number of jobs.

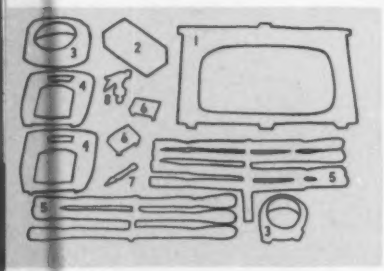
Pre-Plasticizers

A recent development in the injection molding field which ties in with dry coloring is that of pre-plasticization. There are a number of machines currently on the market and under intensive development which employ a pre-plasticizer in conjunction with the regular injection molding cylinder. When dry colored materials are molded in machines employing the pre-plasticizer principle, completely satisfactory coloring results are obtained. The pre-plasticizer serves the function now provided by roll mills or extruders when material is colored in the supplier's plant.

The use of pre-plasticizers is becoming increasingly popular; consequently they should serve as further

Current production applications using colorant blend molding compound include those shown in color, right. Refer to key below. 1) Television mask, by Plastic Ware, Inc., New York, N. Y.; 2) Coca-Cola container, by Louis Marx & Co., New York, N. Y.; 3) Clock case, by Telechron, Inc., Ashland, Mass.; 4) Thermostat housing, by Brown & Bigelow, New York, N. Y.; 5) Brush backs, by Hughes-Autograf Brush Co., Inc., New York, N. Y.; 6) Ring box, by General Electric Co., Taunton, Mass.; 7) Pendant, by Robinson Plastics Corp., New York, N. Y.; 8) Liquor pourer, by Ontario Plastics, Rochester, N. Y.





impetus for adopting dry coloring as a standard method of producing colored items.

Special Effects

In addition to producing the usual transparent, translucent, and opaque colors, there are a number of special effects which can be obtained through dry coloring. Because of the nature of this technique, it is usually possible to arrive at better special effects through dry coloring than through the use of processed colors.

Mottles—Vivid opaque mottles can be produced by dry blending the major component and adding the minor component in pelleted or granular form. Various mottles such as mahogany, walnut, ivory variegations, etc. can be produced. Certain mottles with one transparent and one opaque component can be obtained by dry coloring both. In actual use, the two components are either blended together or poured into the injection machine hopper simultaneously and molded directly. Large nozzles should be used. Large gates and runners are also recommended for the most pronounced mottles.

Fluorescents—Another field where dry coloring shows to good advantage is in the manufacture of fluorescent colors. Here, bright shades which emit pleasing glows when illuminated can be produced at very low cost. Various shades such as pink, green, and yellow are obtainable. Basic color manufacturers[2] supply fluorescent colorants to meet a broad range of requirements. Some of the colorant processors also supply a line of fluorescent colors.

Phosphorescents—In the field of phosphorescent colors, it has definitely been established that dry coloring produces a product superior to processed colored materials. Dry blended samples evidence longer afterglow and better weathering and aging characteristics than moldings produced from compounded colors. Consequently, a large market for dry colored materials which glow in the dark should exist not only for toys and novelties but also for such industrial items as clock cases.

A series of phosphorescent colorants which are suitable for dry blending is being marketed.[3] Concentrations of 3 to 10% of the pigment are recommended for use with Lustrex L2020 Pix-6 Colorant Blend. Tinted phosphorescent shades can also be made by adding small quantities of such colorants as dry powder ultramarine blue and cadmium red to the blends.

Processed phosphorescent colors have heretofore carried a premium of approximately 35¢ per lb. over the standard crystal price. By dry coloring it is possible to produce colored items at a cost of only 5 to 20¢ per lb. over the crystal price, thereby saving 15 to 30¢ per lb. In view of this, the markets for phosphorescent shades will undoubtedly expand to an appreciable degree.

Tinsel—Another novel effect which can easily be produced through dry coloring is that of silverflake or tinsel. The use of imported silver metallics No. 5[4] in a concentration of 10 to 15 g. per lb. of colorant blend, or aluminum flake No. MD-1100[5] in a concentration of 0.5 to 5.0 g. per lb. of colorant blend can be used.

It should be noted that in the molding of dry blended tinsel colors the use of small nozzles, disks, or pin point gates should be avoided, since the tinsel components are usually of sufficient size to plug small orifices. Conventional gates and nozzles should be used.

Colored metallics, increasing in popularity, are economically obtainable by the flexibility of the dry col-

[2] Such as Calco Chemical Div., American Cyanamid Co., Bound Brook, N. J.; Wilmot & Cassidy Co., 108-112 Provost St., Brooklyn, N. Y.; and General Dyestuff Corp., Leroy & Hudson Sts., New York, N. Y.

[3] The New Jersey Zinc Co., 160 Front St., New York 7, N. Y.

[4] Manufactured by Edward C. Balloux, 115 Hudson St., New York 13, N. Y.

[5] Metals Disintegrating Co., 901 Lehigh Ave., Elizabeth, N. J.

oring method. A wide range of green, red, and blue colored metallics are now being produced by this technique. In particular, the West Coast has pushed the use of colored metallics for numerous housewares and toys, offering a whole new range of rich, luminous colors for consumer products.

Advantages of Dry Coloring

The prime advantage of dry blending is economy. Conversion costs are so low that the molder can save several cents a pound compared with the purchase of colored molding powder. In dry coloring styrene crystal the main cost is that of the colorant. For transparent shades, the colorant cost per pound ranges from 0.048 to 0.9¢, while for translucent and opaque formulations the cost is from 0.044 to 1.2¢ per pound. Handling costs should be approximately 0.2 to 0.3¢ per lb. of product. Consequently, the figure of ½ to 1¼¢ per lb. for dry coloring is representative of the actual costs involved. From this it can be seen that a saving of approximately 3¢ per lb. is derived in the production of standard colors.

For special colors, even greater savings are realized. Experience of leading molders indicates that inventory can be reduced by as much as 75 percent. The method affords greater flexibility of operation, a real advantage for special colors particularly during periods of material shortage.

Reworking scrap is another advantage of dry coloring. In the molding of most items, quantities of sprues, runners, and rejected parts are collected. This material must subsequently be ground up and remolded. If individual colors are segregated, the scrap can be re-run directly. However, if the reground colors are mixed, the problem of holding the desired shade arises. Here, dry coloring serves to good advantage. The first step is to blend the various reground colors to see what approximate shade results. Assuming that an off-green, blue, or red is obtained, the corresponding dry color formulation can then be added to bring the resulting color in line with the desired virgin shade.

Brown and black shades can also be produced from reground scrap. If the mixture of scrap yields a gray color, red pigment can be added to produce brown. A mixture of carbon black and red pigment can also be added to the reground colors to yield a brown shade. Similarly, the use of carbon black is recommended as an additive to reground scrap for the manufacture of black molded pieces.

To obtain improved luster and strength, it is suggested that varying percentages of colorant blend (10 to 50%) be added to the reground material before the addition of the colorants.

While the range of color has been one of the main factors in the rapid growth of plastics, many lower priced items have been produced only from crystal, due to lower costs. Now dry coloring provides a method of producing colored items for ½ to 1¼¢ per lb. over crystal costs. Many items hitherto molded in crystal will undoubtedly convert to colors.

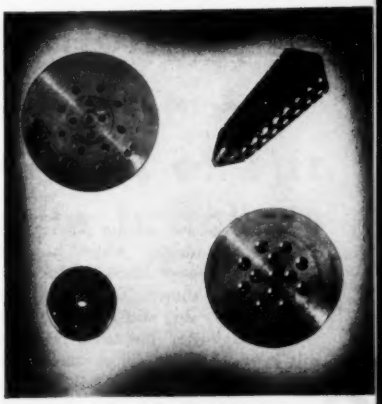
Color Concentrates

Another factor in the field of coloring styrene molding powder, although limited in extent, has been the use of color concentrates. In this method, a color concentrate is prepared by compounding a high concentration of color in the styrene resin. The concentrate can then be blended with crystal styrene in varying ratios (from 2 to 100 parts of crystal per quart of concentrate, depending on pigment concentration) and injection molded directly.

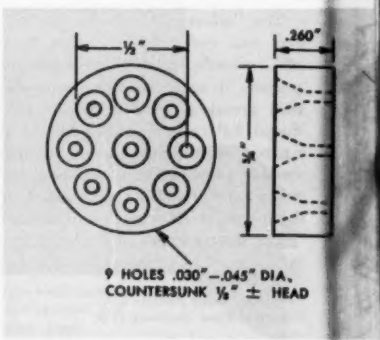
This technique is rather limited in scope. It usually requires thick sectioned pieces and various molding aids to yield satisfactory products. The use of color concentrates does not have the universality of dry coloring, since the latter can be used on pieces with varying thicknesses and design to produce good parts, with or without the use of molding aids. Furthermore, the use of color concentrates is more expensive than dry colorants and usually entails an inventory problem.

Conclusion

The surprising strides made in the dry coloring method during the past few months have by no means reached the saturation point. With continued research and development it is expected that dry coloring will become the predominating method of producing colored styrene moldings. Here is a colorful trail blazer for the industry.

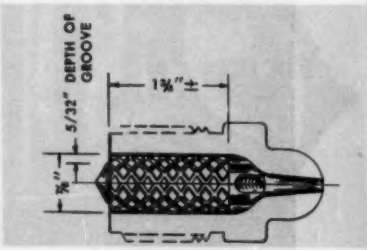


Various mixing plugs used to improve color dispersion and distribution. A cross-section of pineapple type, upper right, is in sketch at bottom of page



One type of dry-color mixing disk has nine countersunk straight-through holes

Recent mixing plug design is pineapple type offering maximum color dispersion and distribution at minimum temperature and pressure increase. It consists of left- and right-hand threads cut into carbon-steel, medium temper rod. Plug position is shown in nozzle



8 Phonograph Records Per Cycle

Injection molding challenges compression in speed and cost

by CLARK F. GALEHOUSE* and HIBBERT W. MOSS†

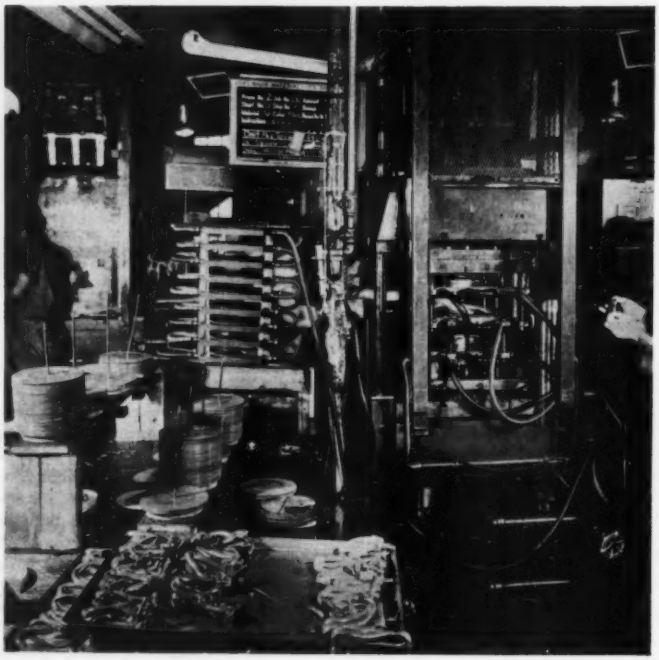
THE only part of the phonograph record industry which has not seen any change since its inception is the well-known RCA-Victor fox-terrier. The dog still listens to "His Master's Voice," but today he hears it in much more dulcet tones than in the days when recordings were separately cut on wax cylinders. Since the time when the shape of records was changed from cylindrical to flat disks, many improvements in quality have been made, and these improvements have come about largely because of better record materials.

The "all-vinyl" unbreakable record has made history, but it is still manufactured in compression presses, in essentially the same way disk pressings were originally produced. LP records, either 33⅓ or 45 r.p.m., require more care in stamper (mold) preparation, in molding, and subsequent handling, but most of them are still compression molded.

The development of a special sty-

(*Continued on p. 89*)

* President, Shelley Products, Ltd.
† Improved Paper Machinery Corp.



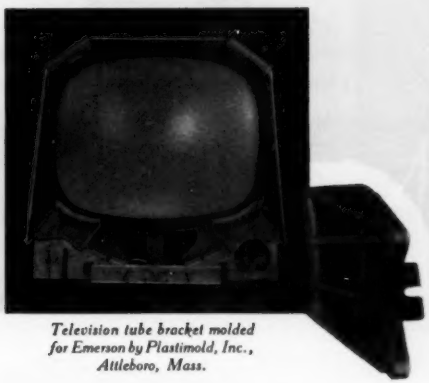
All illustrations courtesy Improved Paper Machinery Corp.

Side view of special 8-cavity record mold. Operator at right (only his hands show) has removed scavenged material and is folding it to convenient size for regrinding. Folded pieces are cooled on trays before regrinding

Development of 8-cavity phonograph record molding method was an outgrowth of work with a single-cavity set-up. Now, as shown at left, long-playing records are being produced in a single-cavity mold using a special newly-developed styrene formulation

"PLASKON ALKYD cut the cost of our television brackets 50%"

says Mr. Dorman D. Israel,
Executive Vice-President
EMERSON RADIO AND PHONOGRAPH CORP.



Television tube bracket molded for Emerson by Plastimold, Inc., Attleboro, Mass.

Meet another enthusiastic champion of Plaskon Alkyd Molding compound!

Mr. Dorman D. Israel, Executive Vice-President of Emerson Radio and Phonograph, like so many other executives of prominent manufacturing concerns, was "sold" by indisputable figures. And the figures, in this case, showed a saving of over 50% in the production cost of television brackets after the switch to Plaskon Alkyd!

But money-saving is never the whole story where quick-curing Plaskon Alkyd is used in a product. Mr. Israel says, "Plaskon Alkyd was selected for our television sets because of its superior mechanical and electrical properties and, particularly, because of its outstanding electric arc resistance."

now turn the page for ----------

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In Canada: Canadian Industries, Ltd., Montreal, P. Q.
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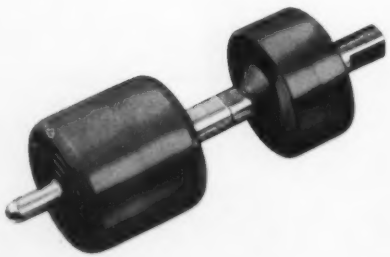
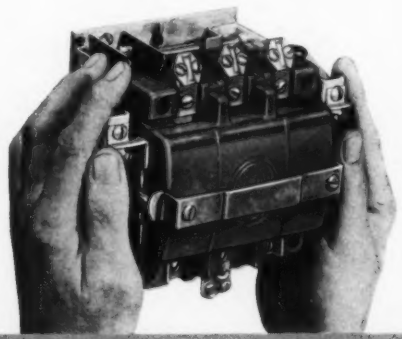
Manufacturers of Molding Compounds, Resin Glues, Coating Resins

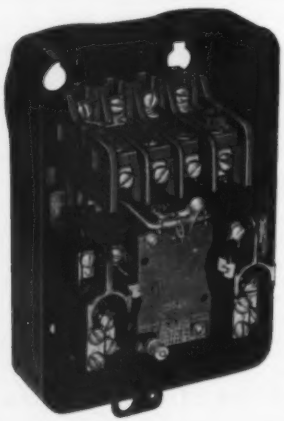
CUTS REJECTS 70%. High voltage capacitors made by Centralab for use in television sets are subjected to a high voltage breakdown test. Rejections were cut 70% when Centralab switched to Plaskon Alkyd.



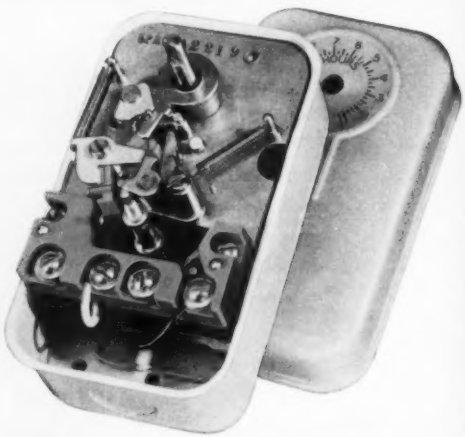
REDUCTION IN SIZE. Exhaustive arc resistance tests faithfully reproducing actual service conditions convinced Arrow, Hart & Hegeman engineers of the unexcelled arc resistance of molded Plaskon Alkyd. This benefit enabled them to redesign and reduce the overall size of their complete line of magnetic starters.



more evidence of savings with PLASKON ALKYD



TIME SAVING 50%; MONEY SAVING 25%. Furnas Electric Company found that the fast molding characteristic of Plaskon Alkyd cut production time 50%. A cost saving of 25% has been realized on the cost of the finished product.



PRODUCTION INCREASED 392%. Switching to Plaskon Alkyd enabled Sangamo Electric Company to produce plastic parts for their time switch nearly 4 times as fast as was possible with a competing material.

HOW

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TO SELL MORE PROFITABLY

Leading producers of electrical and electronic parts have found Plaskon Alkyd a real helper in producing better parts, faster . . . often for less.

Plaskon Alkyd is an ultra high-speed, thermosetting plastic molding compound with excellent electrical properties. It can be molded three to four times faster than conventional thermosetting materials . . . assuring greater production from molding equipment.

Loss from profit-robbing rejects is reduced because Plaskon Alkyd just doesn't require a lot of fussy, kid-glove care to mold. It's much less sensitive to variations in pressure, temperatures and time than other thermosetting materials.

And you can save some real money on tooling costs with Plaskon Alkyd. Simple, less expensive dies are required to mold it. Plaskon Alkyd's high-speed molding characteristics assure greater production from each mold cavity. And fewer cavities are needed to maintain your production schedules.

Plan to use Plaskon Alkyd to produce for less . . . to sell more profitably!

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We're thinking of your future, too, in advertising Plaskon Molding Compounds already in tight supply

Maybe you have been wondering why ads selling the advantages of Plaskon urea and melamine molding compounds continue to appear in spite of the fact that these materials are in short supply.

We believe that this advertising is a good investment. It will pay dividends in the form of future sales . . . not just for us . . . but for our compression molder customers, too.

What's more, we think it's important today that industry be given the facts about materials so they can use them to maximum advantage.

Right now we're doing everything possible to boost the production of Plaskon urea and melamine molding compounds. And one thing you can be sure of . . . to the best of our ability your requirements will be met—and the Molder services which Plaskon offers won't be relaxed.

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rene record formulation by Bakelite, however, bids fair to cause a revolution in the method of forming phonograph record disks, because this material can be made into disks by injection molding, with the economies which are inherent in that method.

[*Ed's. note.* Two molders and at least one major record company are now producing platters by injection molding this special styrene. The methods and equipment used by the two molders are different in several important ways. Complete details on the equipment and process[1] used by Shelley Products, Ltd., Roslyn, N. Y., have been made available for this article, and it is probable that the details of the second process will be published at a later date.]

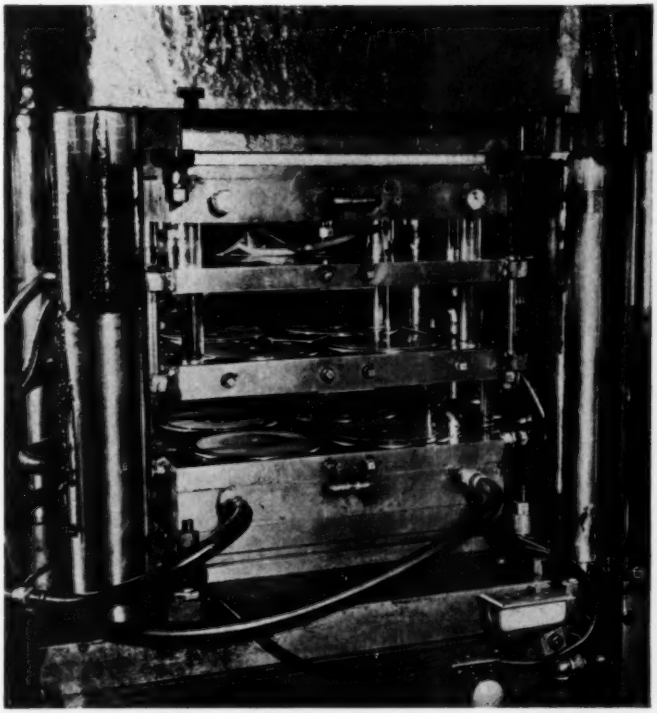
Single Cavity First Used

The first records by Shelley were made with a single-cavity mold run on a 2-oz. Impco (Improved Paper Machinery Corp., Nashua, N. H.) injection machine. Because the record was center gated, a separate runner plate was required to feed the material from the nozzle of the horizontal injection unit to the center of the mold. After the mold was filled out, a vertical acting hydraulic plunger, which is a feature of all Impco machines, moved upward. This plunger forced a pin (the same diameter as the center hole in the record) upward so that it cut the gate cleanly, thereby finishing the center hole to its required size. The material displaced by this operation was forced backward through the runners and sprue and actually forced a small amount of material back into the injection cylinder.

The system worked so well on the single cavity job that Shelley decided to install a larger Impco injection machine and equip it with an 8-cavity mold. This ambitious project did not turn out to be as simple as it appeared. Warping was encountered, and rejects due to other causes were way out of line. It took hours of painstaking adjustments to get the mold running well, after which a slight variation in mold or material temperature would apparently be the cause of poorly formed records.

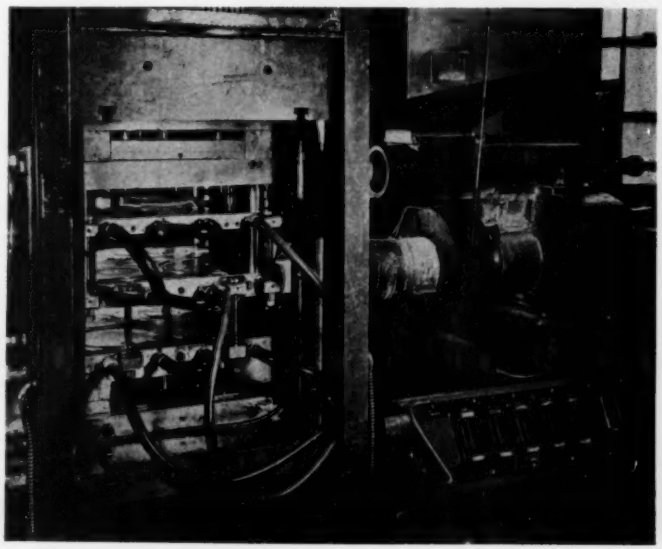
After some months of heartbreaking effort it was decided to

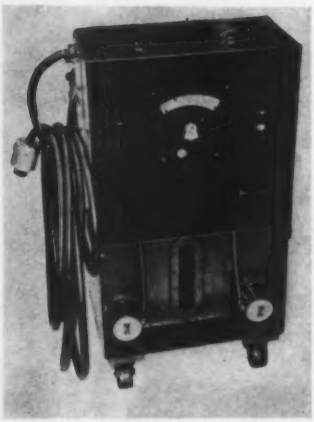
[1] Patent applied for



Close-up of 8-cavity mold showing finished records as well as scavenged material from auxiliary sprues and runners, seen here between the two runner plates below press head

Necessity for keeping mold platens and stampers at uniform temperature requires the use of two closed circulating systems. About 3 gal. of oil per min. circulate through each





Heat exchanger and oil-circulating unit for close control of platen temperature

change the design of the mold. Engineers at Shelley and Impco combined their talents for this job, and a new mold was built. Changes in coring were made, aimed at controlling the temperature of the entire molding area within 2° F. Two closed circulating systems were built into each die half, but it was not until the collaborating engineers built and installed a new type of heat exchanger that this control was achieved. An oil circulating unit is used in conjunction with the heat exchanger in order to circulate the required 3 gal. of oil per min. through the closed systems.

Although the problem of temperature and therefore quality control was overcome by these innovations, another difficulty made itself apparent. The 8-cavity mold was designed in so-called sandwich form, with two sets of 4-cavity molds mounted one above the other in the machine. Each pair of cavities is fed by the same secondary vertical sprue. Trouble was encountered at first because, with this set-up, it is necessary for the gate cutting pin to travel much further and therefore displace much more material than was required for the single-cavity set-up. This trouble was aggravated even further because there were four pins displacing material instead of one. As a result, pin breakage and actual damage to the mold were encountered until the following solution was worked out.

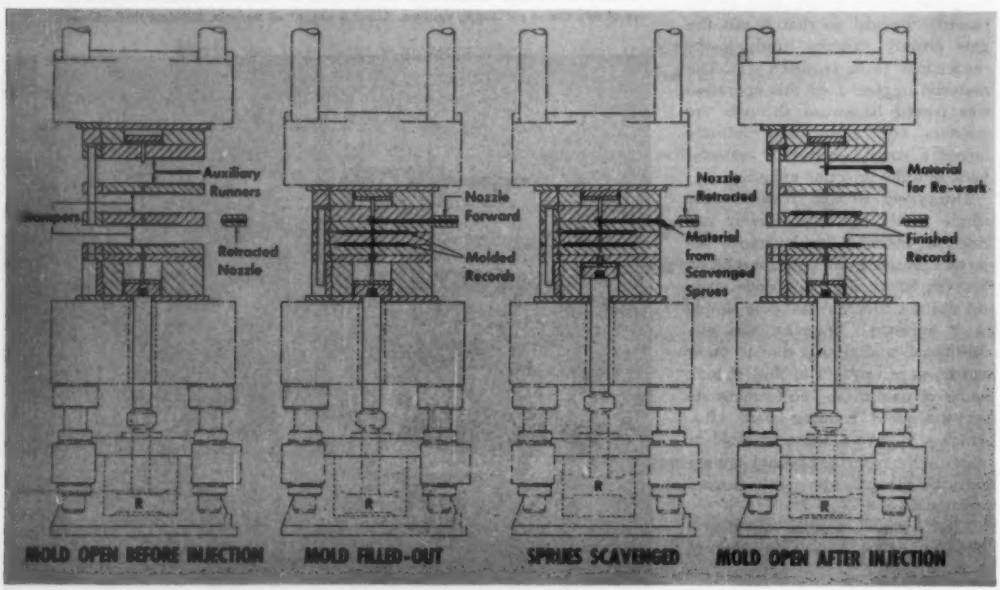
A special and separate electrical control was installed on the injection machine to automatically retract the nozzle from the mold within less than 5 sec. after the stroke of the injection piston is completed. Retracting this nozzle eliminates practically all of the back pressure which had been previously encountered by the gate cutting pins; now the still-soft styrene is merely pushed back along the runners and oozes out the side opening in the mold.

Today practically no rejects are produced except those caused by faulty or worn out stampers; even these rejections are insignificant in number because the life of one pair of stampers is approximately 60,000 records. An interesting comparison of stamper life shows that records produced by compression from filled vinyl wear out stampers after approximately 800 cycles; those produced by the same method from shellac wear out their stampers after approximately 500 cycles.

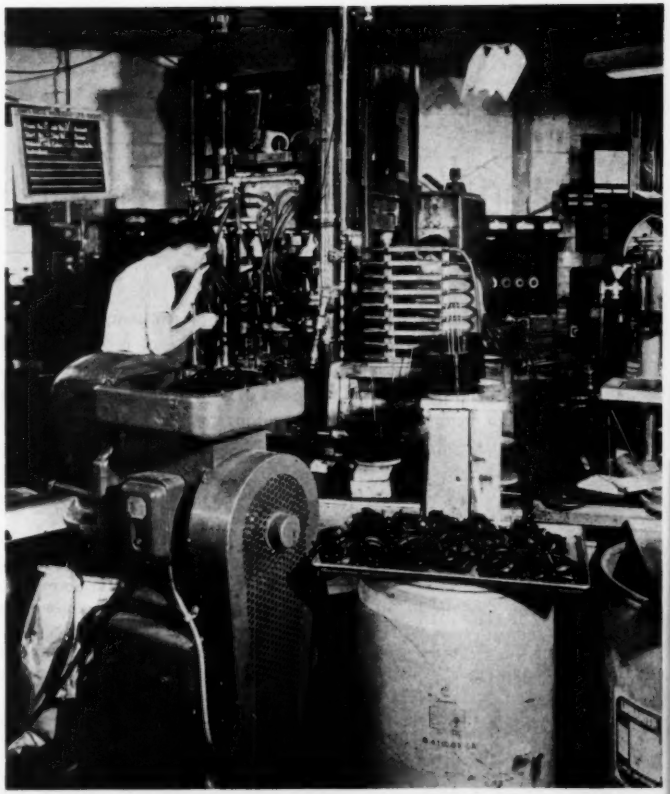
Checking Quality

Quality control at Shelley is achieved by working in lots of 100 records from each pair of stampers. Eight holders, each consisting of a base and a vertical spindle, are used

Sectional view of injection machine, showing four major steps in multi-cavity molding of phonograph records. Only two of the cavities are shown. The vertical acting ram for degating and sprue scavenging is indicated by the letter "R" near the bottom of each drawing



Over-all view of one 8-cavity set-up, with DeMattia nibbler in left foreground. A 9-platen water-cooled cooling fixture is at the right of the press, also racks for keeping separate the 8 records molded in one cycle



to receive the records as they come from each of the eight stampers. When each holder is filled with 100 records, an identifying disk is placed on top of each stack, and the entire set is sent to the inspection department. Here one record from each of the eight sets is played back. By this continuous method of inspection, any stamper difficulty invisible to the naked eye is caught before a sizable number of rejects has been molded. Even when a stamper is worn out, machine down time is insignificant. This time saving results from the development of an ingenious clamping mechanism whereby sets of stampers can be changed in less than two minutes.

Labeling Records

Although it is mechanically feasible to mold the labels directly on the records, the time consumed in loading 16 labels for each shot slows the molding cycle down so much that it is far better from an economic standpoint to apply the labels to the records in a subsequent operation. A straight line set-up is used for visual inspection, collating, labeling, and packing. A moving belt is used to carry the records through the various steps. Two automatic labeling machines, manufactured by New Jersey Machine Corp., Hoboken, N. J., using special labels produced by Nashua Gummed & Coated Paper Co., Nashua, N. H., make the labeling operation simple and rapid.

The Shelley plant is now in 24-hr. a day production, and each 8-cavity mold produces better than 700 records every hour.

Final inspection, labeling, and packing of records. Two operators at center are labeling records with automatic equipment. The labels are coated with heat-sensitive adhesive which will bond tightly to the styrene records

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"The development and sale of a satisfactory plastic compound is but the beginning of an epic. It remains for the molder, laminator and fabricator, through perseverance, courage and ingenuity to write the plot and ending . . . Cyanamid's PLASTICS NEWSFRONT will be devoted to stories of their achievements with the hope that its readers will come to recognize the great importance of these companies and the services they are able to perform."

That's what the dedication said in the first issue of PLASTICS NEWSFRONT published way back in 1945.

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JANUARY 1951

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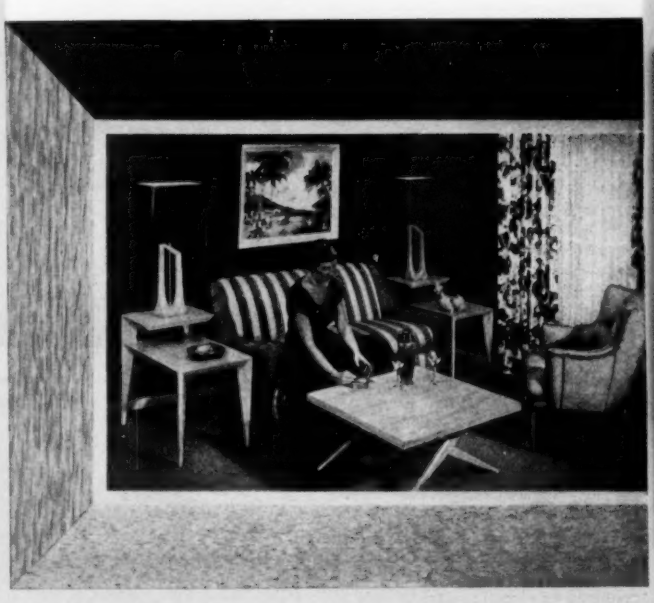

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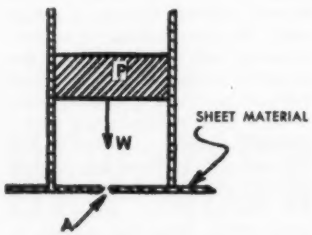
Electric Control of Porosity

by JEROME J. SURAN†

IN THE application of plastic sheet materials to commercial uses, one of the serious objections which often arises is the impermeability of the material to fluid flow. It is thus desirable to have a process which permits the control of porosity in sheet materials. Such a process, commercially known as electroventing, consists of passing electric sparks through a sheet material in such manner as to produce a desired distribution of holes of a specified size. The combination of holes and number of holes will determine the fluid flow characteristics of any material. This article will deal specifically with air flow through plastic and paper sheets, together with an account of how the porosity may be controlled by electroventing.



1—Action-equivalent diagrammatic scheme shows operation of Gurley Densometer for measuring air flow.

A standard instrument used to measure air flow through sheet materials is the Gurley Densometer.[1] An oversimplified but action-equivalent diagram of this instrument is shown in Fig. 1. The piston P of weight W is free to move downward. A sheet material to be tested for air porosity is placed in the way of the air displacement so that air can escape from the underside of the piston by passing through only the vented area A of the sheet. The time that it takes a certain volume of air to pass through A is recorded as the sheet material porosity, measured in seconds. Thus, a material having a porosity of 20 sec. is more porous than one having a porosity of 40 seconds. (The porosities recorded in this article will apply generally to an air volume of 50 cc. and a piston pressure of 1.25 p.s.i.).

In considering the phenomena of fluid flow through any type of opening, we must bear in mind that two basic types of flow exist. One type is that encountered in a simple orifice where the rate of flow is proportional to the square root of applied pressure. This simple orifice flow is given by the equation[2]:

$$q = A\sqrt{2gh} \qquad \text{(Eq. 1)}$$

where q is the volumetric rate of flow, A is the orifice area, g is the gravitational constant of acceleration, and h is the pressure applied to the fluid. However, when frictional resistance enters into the action of fluid flow, the rate of flow approaches a condition where it is proportional directly to the applied pressure. Purely frictional flow would be given by the equation:

$$q = Rh \qquad \text{(Eq. 2)}$$

where R is the proportionality constant between q and h and represents a measure of the frictional resistance of a sheet to fluid flow.

Experiment has shown that sheet materials having holes whose diameters exceed 6 mils behave as simple orifices with respect to air flow, the latter being given by equation 1. Transition from simple orifice to frictional flow occurs when the hole sizes fall into the 2 to 6-mil diameter range. When a sheet material has holes measuring no more than approximately 1 mil in diameter, the fluid flow characteristic becomes almost entirely frictional and is given by equation 2.

The transition from simple orifice to frictional flow, as the pore size in

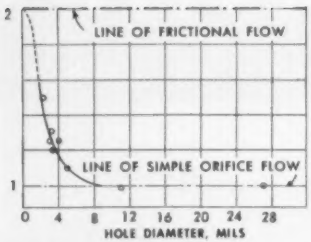
[2] "Hydraulics" by R. L. Daugherty, Chapter VI, 4th edition, McGraw-Hill Book Co., Inc. (1937).

Table I.—Effect of Electroventing Polyvinyl Film on Tensile and Tear Properties[a]

Condition of polyvinyl chloride film	Tensile strength A	B	Max. dev.	Tear (Elmendorf) A	B	Max. dev.	Elongation A	B	Max. dev.
	kg.	kg.	%	g./sheet		%	%	%	%
Non-Vented	3.5	3.3	24	432	864	19	447	600	16
Electrovented	2.8	2.6	19	272	928	23	313	427	25

[a] The tensile and elongation tests were made on strips 1.5 cm. wide; direction A and direction B are at right angles to each other. Maximum deviation refers to the maximum deviation of a single reading from the average, the latter being the result of five tests. The film was 0.005 in. thick.

* Reg. U. S. Pat. Office.
† Engineer, J. W. Meaker & Co., New York, N. Y.
[1] Manufactured by W. & L. E. Gurley Co., Troy, N. Y.



2—Transition from simple orifice to frictional flow as pore size in electrovented neoprene is reduced. Temperature of test sheet is 70° F.; relative humidity, 40%; barometer, 30.3 in. Hg.

a sheet of neoprene is reduced, is shown in Fig. 2. The dotted portion of the curve is extrapolated in this particular case; however, plastic sheets have been electrovented with such small holes that the type of air flow is almost exactly on the line of frictional flow in Fig. 2. Natural Kraft paper exhibits a property of purely frictional flow. It follows that if plastic sheeting is to be made to act like paper in air flow, numerous holes of approximately 1 mil diameter or less must be electrovented into the plastic sheet.

In many instances, frictional type flow is more desirable than orifice flow, for the former responds more readily to pressure changes. Control of the hole size in porosity considerations thus becomes important because of the effect of hole size on the character of fluid flow through the sheet. Hole size is also important in packaging techniques where protection against foreign particles is essential but where air or gas porosity is required.

Electric Control of Porosity

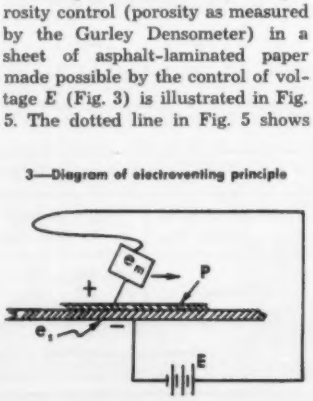
Thus far we have demonstrated that the rate of air flow and the type of air flow depend upon the number and size of holes in a sheet material. Control of these two factors may be accomplished by controlling the conditions of dielectric breakdown in a sparking process. This is done in electroventing.

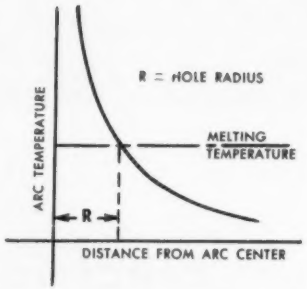
To demonstrate the principle involved, consider the simple case illustrated in Fig. 3. A movable electrode *em* and a stationary, flat plate electrode *es* are connected to a high-voltage power source *E*. When the movable electrode *em* is moved across the plastic sheet material *P*, and the voltage *E* is made equal to or greater than the breakdown voltage of *P*, a series of arc discharges through the plastic material will take place. Heat generation by an arc discharge will cause the plastic material to plasticize in the immediate area of contact; when this region has cooled, a permanent hole will have been made. Microscopic examination of the surface area around the hole reveals the existence of a concentric layer of polymerized material. It is this polymer ring that accounts for the fact that many plastic sheet materials may retain their electrovented holes even after the surface temperature is raised above that of the distortion temperature of the plastic sheet.

The voltage required to break down a plastic sheet is proportional to the dielectric strength of the material times the thickness of the sheet. Once breakdown has occurred, the voltage between the electrodes will fall to a value of that required to maintain the arc; current will flow through the ruptured sheet and will be limited only by the external circuit impedance. The thermal energy of the arc discharge is proportional to the square of the current times the time duration of the arc. Hence, for a given time duration, the thermal energy supplied to making a hole can be controlled by control of the current. The greater the thermal energy, the greater will be the arc temperature at the center of the discharge. In plastic sheets, the size of the hole will depend upon the distance from the center of the arc where the temperature falls to the melting or cooling point of the material (see Fig. 4).

An experimental curve of the porosity control (porosity as measured by the Gurley Densometer) in a sheet of asphalt-laminated paper made possible by the control of voltage *E* (Fig. 3) is illustrated in Fig. 5. The dotted line in Fig. 5 shows

3—Diagram of electroventing principle





4—Relation of arc temperature to hole size in electroventing plastic sheets

the way the individual hole diameter increases as a function of the applied voltage for a plastic-coated paper. It should be remembered that the actual voltage across the arc discharge is, ideally, independent of the applied voltage *E*. However, the current in the arc is directly proportional to *E*; therefore the voltage axis in Fig. 5 is a proportional current axis for the arc.

From experimental observation, it seems that there are two phases to an arc discharge through a plastic sheet. Phase one consists of an ionization of both the material and the air path. Ionization of the organic material may lead to disintegration of the organic molecule and a subsequent deposition of carbon on the adjacent surface. There may also be chemical effects on the surrounding area due to photon emission and ozone action. Phase two consists of a sustained thermal action with a subsequent temperature effect as illustrated in Fig. 4 and described above. It is essentially phase two of the process which permits a close control of the perforation area.

In commercial applications of the process, the electrode structure is stationary, and the dielectric sheet material moves. A bank of electrodes is connected across a high-voltage source so as to form a series connected, multiple spark gas circuit. The sheet material moves through the gaps and is perforated by the arc discharges. Figure 6 illustrates the electrical circuit of one bank of electrodes, and the arrows indicate the path which the current pulses follow. The number of electrodes which can be operated from one voltage source depends upon the dielectric breakdown potential of

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the material as well as the potential of the source *E*.

For cases where the dielectric breakdown potential is too high for the practical application of the electroventing unit, the electroventing stage is preceded by a needle roller which mechanically breaks the dielectric surface. Subsequently, the electric arcs find their way through the needle holes where the thermal effects described above take place. Thus, the arcs jump through air gaps rather than the dielectric material, and the effective dielectric strength is reduced to that of air. Needle rollers cannot be used without electroventing since holes made mechanically in plastics close up quickly.

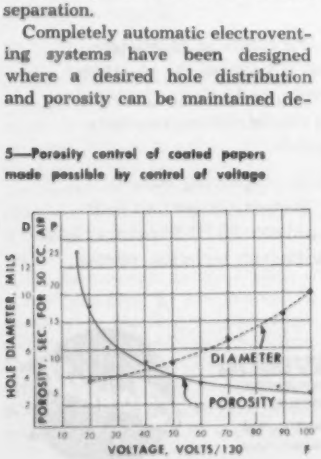
The faster the sheet material moves through the gaps, the more power is required to effect a given porosity. At the time of this writing, paper has been electrovented up to speeds of 1000 ft. per minute. Commercial models of electroventing units designed for paper operation at speeds of approximately 400 ft. per minute operate successfully with power consumptions of up to 25 kw. High potential DC with associated pulse-delay circuits may be employed to give any desired hole distribution for any speed, or a high potential AC may be applied to the electrode bank directly to give any desired hole distribution for a particular speed. The required AC frequency is given by the equation:

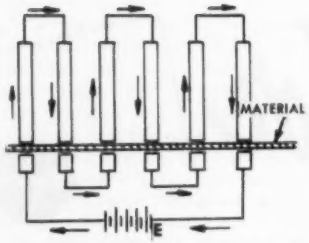
$$f = \frac{vs}{2} \qquad \text{Eq. 3}$$

where *v* is the sheet material velocity (linear) and *s* is the desired hole separation.

Completely automatic electroventing systems have been designed where a desired hole distribution and porosity can be maintained de-

5—Porosity control of coated papers made possible by control of voltage





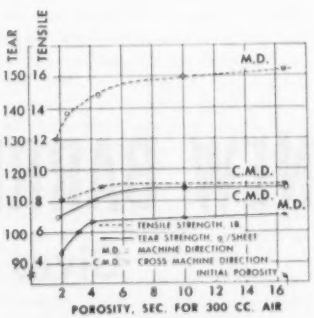
6—Diagram illustrating electrical circuits involved in electroventing process

spite changes in the sheet material velocity and dielectric properties. Tachometer feedback to the pulse-delay circuits is used to maintain the desired perforation distribution against changes in speed. This same tachometric feedback is associated with a safety relay whereby the electroventing system is completely shut off in the event the sheet material tears, or in the event the material velocity should fall below a safe value. Thus, any possibility of fire is precluded. The delivered porosity can be sensed by either photo cells or vacuum chambers. Information thus picked up by the sensing devices is fed to a comparator circuit where the desired porosity is compared to the actual delivered porosity. Should a difference between the desired and delivered values exist, a servo system automatically compensates the power consumption to eliminate the difference.

Effects of Electroventing

The effect of electroventing on the strength characteristics of paper has been evaluated. There appears to be little or no decrease in strength over a wide range of porosities produced by electroventing. However, at a critical value of porosity the strength values drop off sharply. Curves of tear and tensile strength both in the machine and cross-machine directions for 0.005 in. thick Alabama Kraft sheets are shown in Fig. 7. The tensile load was applied to a specimen 1 in. wide between testing jaws located 3 in. apart. The tearing load was exerted on a strip 2.5 in. wide by 4 in. long. The paper has an initial porosity of 16.7 sec. for 300 cc. of air. Samples were then electrovented to give porosities of approximately 10, 4, 3, and 2 sec., respectively. The decline in the tear and tensile properties is negligible until a value of from 4 to 5 sec. is reached; decline is then rapid when the porosity is increased from this critical range. Whether or not similar relationships exist for plastic sheets has not as yet been determined. However, the test values[3] for two samples of polyvinyl chloride films are in Table I.

Electroventing permits a control of porosity in sheet materials which has hitherto been unobtainable. Application of the process has already been made to the venting of paper, hats, and shoes; its possibilities in the field of plastic sheet materials are numerous. A porosity control process in the manufacture of paper permits the manufacturer to concentrate on the strength of the sheet without regard to porosity considerations; thus, one of the variables in the manufacturing stages is removed. When cellulose or plastic films are applied to the packaging of food, a need for porosity may arise.[4] Electroventing provides a means of adding any desired poros-



7—Effect of electroventing on strength of 0.005-in. thick Alabama Kraft paper

ity to the packaging film for various types of packaging requirements. In the application of plastic materials to apparel use, many occasions arise where porosity becomes a critical consideration. By electroventing, pores of a permanent nature are processed into the plastic material. When fully developed in the numerous fields where it may apply, electroventing will undoubtedly open up new areas for plastic sheet materials.

[3] Report No. 330272, Electrical Testing Laboratories Inc. (Feb. 1949).

[4] "Comparison of Film Types and Film Perforations in Tomato Pre-packaging" by Kaufman and Kruschka, Pre-Pack-Age 3, 6 (Feb. 1950).

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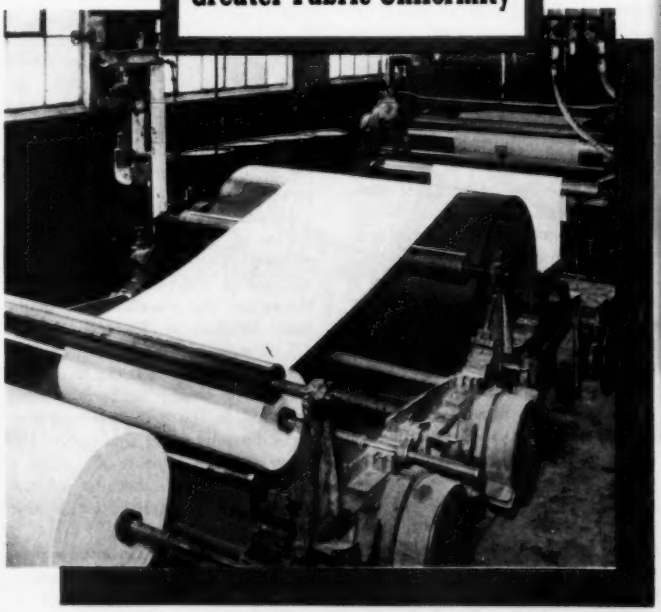

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Fritted Fluorothene Filters

by W. H. REYSEN*, D. S. NAPOLITAN*, W. T. DANIEL**, and R. H. LAFFERTY, Jr.*

A method has been developed for preparing filter disks with a wide range of porosities from Fluorothene (polymonochlorotrifluoroethylene) powder by using a flame-spraying technique which is described in detail. These disks retain most of the inertness characteristics of polymonochlorotrifluoroethylene, thereby enabling them to be used where other filters are unsatisfactory.

IT has been reported[1] that polymonochlorotrifluoroethylene is chemically unaffected by concentrated alkali and acid solutions, organic solvents, and even fluorine and metallic fluorides. All types of laboratory equipment have been fabricated from this material, thus making possible certain operations which previously had been either exceedingly expensive or impossible to perform. The only major item which was still lacking and which, therefore, limited the scope of experiments performed with Fluorothene laboratory equipment was a filtration medium which would have comparable chemical resistance. Consequently, an effort was made to prepare fritted Fluorothene using various techniques akin to powder metallurgy. All proved to be unsatisfactory with the exception of the flame-spraying method.

This report describes the preparation of fritted Fluorothene, including certain techniques which have been developed to vary porosity and increase strength and dimensional stability. A description of the materials produced thus far is included together with the results of certain tests which were performed to determine the chemical and physical limitations of filters prepared from these materials.

* Carbide and Carbon Chemicals Div., Union Carbide and Carbon Corp., K-25 Plant, Oak Ridge, Tenn.

** Present address: Box 198, Route 2, Eastland, Texas.

[1] S. E. Frey, J. D. Gibson, and R. H. Lafferty, Jr., "Effect of Chemicals on Fluorothene," presented before the Paint, Varnish, and Plastics Chemistry Div. at the 116th Meeting of the American Chemical Society, Atlantic City, N. J.

Preparation of Filters

Preparation and Classification of Powder—Powder suitable for flame-spraying was prepared from cores obtained from the "block" polymerization of monochlorotrifluoroethylene. These cores were chipped in a Supreme dry-ice crusher especially adapted for this purpose. The chipped material was further reduced to a size suitable for classification by passing it through a Cumberland granulator and then through a Bantam micropulverizer.

In early experiments, all powder was classified by means of sieves and a Ro-Tap sieve shaker; however, in later work it was found that the same result could be achieved much more rapidly and efficiently by using a Federal Classifier (Laboratory Unit B-2) in which air is used to convey and classify powder.

In order to achieve a reasonable degree of uniformity in the fritted material it was necessary to govern the size of the powder particles to the extent that essentially all would pass through a 50-mesh screen (U. S. sieve size) and substantially none through a 200-mesh screen. Somewhat better uniformity was achieved in the flame-sprayed material by narrowing this range, but it was decided not to do so as a routine procedure because of the additional time required for powder preparation.

It was found that too large a proportion of fine powder complicated the feed problem and that much of it disappeared completely because it ignited to form gaseous by-products during the flame-spraying operation.

Flame-Spraying Equipment—Two types of Schori pistols, Model 2000 and Model L, were used to flame-spray the plastic powder.[2] Both operate on the same principle, but Model 2000 is equipped to handle a larger quantity of powder per unit time.

[2] Morton J. Guridin, "Flame-Sprayed Plastics," *Iron Age 158*, No. 8, 64 (1946).

Much of the original experimentation was done with Schori pistol Model 2000. All of the flame-spraying was done by hand. The distance from the gun tip to the work surface was kept within the range from 18 to 24 in., and the gas pressures were kept within the following limits: acetylene, 15 to 20 p.s.i.; oxygen, 15 to 20 p.s.i.; air, 25 to 50 p.s.i. Filtration disks as large as 16 in. in diameter and ½ in. thick were prepared using Model 2000.

Most of the work of preparing flame-sprayed samples was done with Schori pistol Model L because the powder container unit purchased with it was smaller and more adaptable to experimentation. This unit consisted of a powder cone with a screen at the top and a set of powder-flow controls and an air-flow adjustment screw at the bottom, all mounted on a stand equipped with an electric vibrator. The screen was removed and the orifice and the air-flow screw were adjusted to permit passage of a maximum quantity of powder through the pistol. The electric vibrator on the stand was found insufficient to prevent clogging, but this difficulty was overcome by mounting an electric drill so that a 1/16 in. diameter welding rod could be turned slowly just over the orifice of the powder cone. A fairly uniform flow was maintained using this technique. As with Model 2000 pistol, all flame-spraying was done by hand, although a slight improvement was made in that a horizontal guide bar was set in front of the metal base to be sprayed to maintain the distance from the gun tip to the work surface at 13 to 14 inches. The gas pressures were kept within the following limits: propane, 15 to 20 p.s.i.; oxygen, 28 to 33 p.s.i.; and air, 38 to 40 p.s.i. In a typical preparation, an average of 57 g. of powder per min. was fed into

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the pistol; 56% of the 50-to-200-mesh powder was recovered as fritted Fluorothene or partially densified powder. Some flame-spraying was done with powder finer than 200 mesh, but yields were so low that this work was abandoned.

Finishing Operations on the Disks—Filter disks were prepared from the flame-sprayed plastic by cutting to the desired dimensions with a power-driven band saw. The surfaces of these disks were rough and sometimes contained loose powder as illustrated in Fig. 1-A. This condition was rectified by buffing with a sander equipped with a belt containing No. 2-36 grit. A coarse belt was used at a very slow speed in order to prevent sealing of the plastic surface which often occurred when too much friction caused overheating. Figure 1-B shows a disk which has been buffed. Some of the surface pores have been sealed by the buffing action.

When it was necessary to prevent flow through the edges of the disks, these surfaces were sealed by rotating them on a metal-surface which was heated to approximately 500° C. An alternative method was to seal them by friction using a fine-grained belt at a very high speed.

Certain techniques were developed to improve the mechanical properties of the disks and reduce the size of the pores. Under proper conditions, both could be accomplished by sintering in an oven for 0.5 hr. or longer at 215° C. However, this often resulted in warping or sealing or both. Figure 1-C indicates that the surface particles of the sintered sample have become glazed with an accompanying shrinking effect.

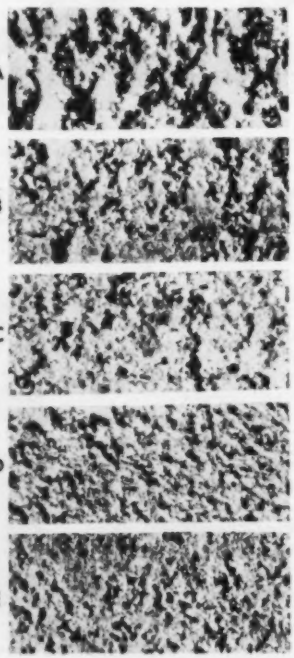
A more effective method of reducing the pore size was to rub finely-divided powder into the pores of the disks with a horsehair brush and then sinter for a short period of time, usually 10 min. at 215° C., in order to hold the powder in place. Figure 1-D illustrates the results of this method. Although at times effective, this method was difficult to control.

The most successful treatment was cold-pressing which was done in a Carver Laboratory press at pressures up to 2300 p.s.i. Various degrees of porosity were obtained without destroying the point to point bonding between the partially densified powder particles. A buffed sample which was treated in this manner is shown in Fig. 1-E. The average pore size has been reduced, since most of the particles have been pressed into the larger of previously existing voids.

Tests of Filters

Fluid Friction—Before the conditions for flame-spraying Fluorothene were definitely established, an empirical test was devised to make porosity and mechanical strength comparisons between filter disks which were prepared from various batches of flame-sprayed material. A typical disk for general performance, untreated except for cutting, buffing, and sealing, had a thickness of 1/16 in., an effective filtration area of 3.14 sq. in., and a weight after vacuum drying at 60° C. of 25.96 grams. The disk was placed in a specially-designed stainless steel holder between soft rubber gaskets, and approximately 1000 gal. of water was passed through in 17¾ hr. at pressures varying from 7.0 to 11.6 p.s.i. The initial rate was 0.45 gal./min./sq. inch. The dirt in the water supply made a prolonged constant-pressure test impossible without setting up an elaborate pumping and recirculating system. After cleaning with aqua regia to remove rust, and other foreign particles, the disk was vacuum-dried and reweighed. The weight-loss due to fluid friction and handling was 0.19 percent. An added 2100 gal. of water was passed through at 10.0 to 16.8 p.s.i. with a subsequent loss of only 0.02 percent.

1—Magnified filter samples: A) unbuffed; B) buffed; C) buffed and sintered; D) buffed, powder-rubbed, and sintered; E) buffed and cold-pressed



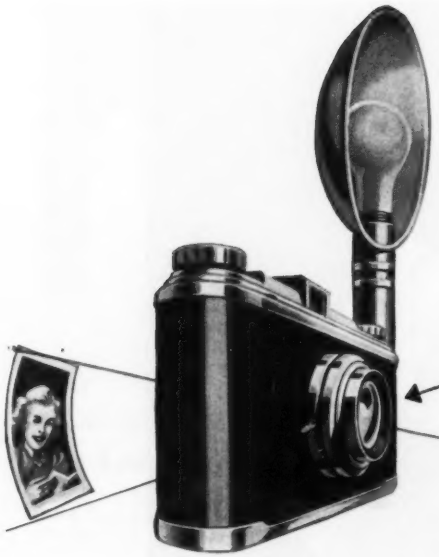
Pore Size—A filter disk was prepared from flame-sprayed material and cold-pressed at 2300 p.s.i. Air was passed through it at a constant pressure difference of 10 cm. of mercury over a wide range of back pressures. The disk was found to have pores with a calculated[3] average diam. of about 3 to 7 microns.

Effect of Reagents—Three sintered and three undensified filter disks were immersed in boiling 65-70% nitric acid for 3 months. Other than a slight warping of the densified disks, no apparent physical or chemical change occurred. Tests for fluoride and chloride ions in the acid were negative. This resistance to strong reagents at comparatively high temperatures for a prolonged period of time makes it possible to completely remove most radioactive contaminants.

A 3-day immersion of undensified disks in ethyl ether, trichloroethylene, and acetone at room temperature indicated that in all cases some solvent had been absorbed and that a small fraction of polymer had been dissolved. However, the porosity of the disks remained essentially unchanged. The fact that some of the polymer dissolved is attributed to the thermal degradation which took place during flame-spraying. Only in the case of ethyl ether were polymer losses at high as 0.4%, and this result was anticipated from previous data which indicated that of all the organic reagents tested, ethyl ether was the one most readily absorbed by Fluorothene. Additional solvent treatment indicated that for all practical purposes, the soluble polymer, amounting to an

(*Continued on p. 163*)

[3] H. Adzumi, "Flow of Gases through a Porous Wall." *Bull. Chem. Soc. Japan 12*, 304-12 (1937).



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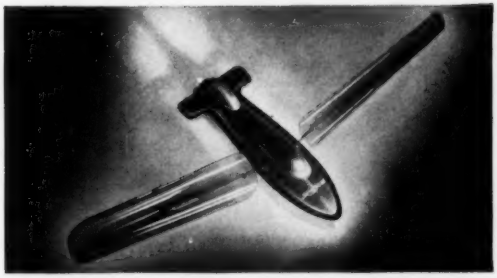

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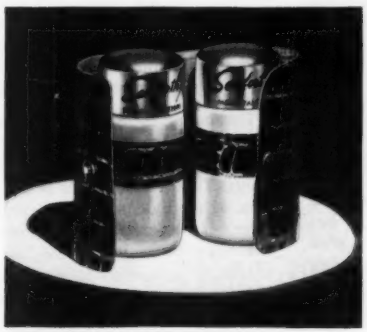

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PLASTICS DIGEST*

Abstracts from the world's literature of interest to those who make or use plastics or plastics products. Send requests for periodicals to the publishers listed.

Testing

AN IMPROVED INSTRUMENT FOR THE EVALUATION OF THE PHYSICAL PROPERTIES OF HIGH POLYMER COMPOSITIONS. I. Williamson. Brit. Plastics *23*, 87–90, 102 (Sept. 1950). A torsion device for measuring the modulus of rigidity of plastics is described in detail. Typical results obtained with various polyvinyl chloride and cellulose nitrate plastics over a temperature range of —60 to +100°C. are reported.

ELASTOMERIC TEST FILMS FROM ACIDIC LATICES. T. B. Blevins, W. S. Wright, and F. Leonard. Anal. Chem. *22*, 1205–7 (Sept. 1950). A method for casting and testing essentially flaw-free films from acidic type latices consists of casting against the interior cavity of a cylindrical gypsum mold. The method permits drying of the film from both surfaces and prevents the formation of an impervious surface film, which would later cause imperfections. Films 0.060 to 0.090 in. thick can be deposited in 1 to 2 hr. using a latex containing 50% solids. Measurements of tensile strength and microscopic examination of samples cut from the films cast according to this technique showed that those samples which gave inordinately low values of tensile strength broke through a bubble visible only under the microscope. Suggestions are given for evaluating tensile test results.

MEASUREMENT OF 60-DEGREE SPECULAR GLOSS. H. K. Hammond and I. Nimeroff. ASTM Bull. *1950*, No. 169, 54–6. (Oct. 1950). An ASTM method of test for the 60-degree specular gloss of paint finishes is based on research done at the National Bureau of Standards more than 10 years ago. Until 1949 the method prescribed the illuminator and receiver apertures to be used but gave no tolerances. In order to determine tolerance requirements and to assist the Bureau in determining the requirements for accurate calibration of gloss standards, the rate of change of gloss reading with change of aperture was investigated throughout the gloss scale. Data obtained show that a pair of standards with widely different distributions of reflected light flux are required to check the adjustment of glossmeters for conformance to ASTM requirements in the increasingly important medium- to high-gloss range.

Chemistry

SOME POLYMERIC DERIVATIVES OF PHOSPHONITRILE CHLORIDE. C. J. Brown. J. Polymer Sci. 5, 465-71 (Aug. 1950). The reactions of phosphonitrile chloride with phenols and substituted amides were investigated. Some of the substances formed polymerize readily to give high-boiling oils or thermoplastic resins. A new reaction was found between phosphonitrile chloride and certain substituted anilides, such as acetanilide and diphenylurea. Equations for these reactions are suggested. It is evident that the phosphonitrile radical behaves as a unit of high stability, with chromophoric potentialities, readily giving rise to chain polymers.

POLYMERIZATION OF *m*- AND *p*-FORMYLSTYRENES. R. H. Wiley and P. H. Hobson. J. Polymer Sci. 5, 483–6 (Aug. 1950). Polymers and copolymers of *m*- and *p*-formylstyrene prepared by bulk and emulsion techniques are fusible and insoluble in a wide variety of organic solvents. The presence of the electrophilic formyl group does not appear to alter the polymerizability of these compounds. *m*-Formylstyrene was prepared by decarboxylation of *m*-formylcinnamic acid and characterized.

DECOMPOSITION OF CYCLOHEXYL HYDROPEROXIDE AND THE PEROXIDE-CATALYZED POLYMERIZATION OF STYRENE. A. Farkas and E. Passaglia. J. Am. Chem. Soc. *72*, 3333–7 (Aug. 1950). The rate of polymerization of styrene was studied in the presence of cyclohexyl hydroperoxide. The degree of polymerization of the polymer formed as determined by viscosity measurements was found to be about three times larger than the number of styrene molecules polymerized per peroxide molecule decomposed.

Properties

HIGH POLYMER SOLUTIONS. I. VAPOR PRESSURE OF POLYSTYRENE SOLUTIONS. C. E. H. Bawn, R. F. J. Freeman, and A. R. Kamaliddin. Trans. Faraday Soc. *46*, 677–84 (Aug. 1950). Measurements were made of the vapor pressure of polystyrene solutions in toluene and methyl ethyl ketone at different temperatures. The heat of dilution of polystyrene by toluene is zero. The results are discussed in relation to the existing theories of the free energy and entropy of dilution of polymers.

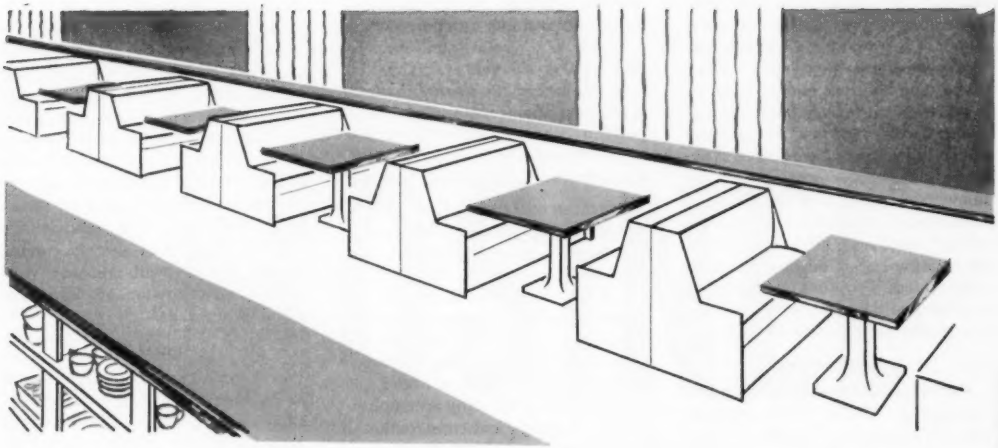
ANALYSIS OF SHEAR STRENGTH OF HONEYCOMB CORES FOR SANDWICH CONSTRUCTIONS. F. Werren and C. B. Norris. NACA Technical Note 2208, 18 pp. (Oct. 1950). A mathematical formula for the shear strengths of honeycomb cores for sandwich constructions is derived. It is applied successfully to honeycomb cores made of resin-impregnated paper.

DIFFUSION OF SOME HALO-METHANES IN POLYSTYRENE. G. S. Park. Trans. Faraday Soc. *46*, 684–97 (Aug. 1950). The over-all rates of absorption of methylene chloride, chloroform, carbon tetrachloride, methyl bromide, bromoform, and methyl iodide by polystyrene sheet were measured at several surface concentrations. Diffusion coefficients obtained from these data are related to the penetrant concentration. The results are interpreted in terms of the theory of rate processes. Energies and entropies of activation are obtained from coefficients obtained at different temperatures.

Coatings

STYRENATION OF DEHYDRATED CASTOR OIL. H. M. Hoogsteen, A. E. Young, and M. K. Smith. Ind. Eng. Chem. *42*, 1587-91 (Aug. 1950). In order to evaluate more extensively the relationship between the properties of dehydrated castor oil and of the styrenated product based on the oil, a series of oils was prepared under different conditions and made to react with styrene using both mass and solvent methods of polymerization. The properties of 23 oil samples are

* Reg. U. S. Pat. Office.



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listed in two tables, and the interrelationships are shown in three graphs. The properties of the styrenation products are reported in two tables, and the rate curve is plotted for three of the styrenation reactions. A relationship is found to exist between the viscosity and degree of dehydration of the castor oil and the homogeneity and film properties of the styrenated product. The most desirable products are obtained by styrenating castor oil that has been dehydrated to a minimum hydroxyl content and then has been bodied to a viscosity approaching 15 poises.

Applications

POLYSTYRENE AND POLYETHYLENE IN ELECTRICAL CABLE DEVELOPMENTS. Plastics (London) *15*, 243–4 (Sept. 1950). Coaxial cables are built with disk-type separators, semi-cylindrical thimbles, and continuous tape insulators made of polystyrene and polyethylene.

ADHESIVES FOR LAMINATIONS. W. Sederlund. Modern Packaging *24*, 149–51, 203 (Oct. 1950). The various types of adhesives used in the manufacture of film and foil laminants are described. Ordinary paper lamination and film-and-foil laminations require different types of adhesives because of: 1) basic structural differences; 2) the comparative insolubility of cellulose as compared to many synthetic polymeric sheetings; 3) the permeability of paper vs. the impermeability of films and foils; and 4) the different end-use requirements of paper laminations compared to film-and-foil laminations. The adhesives used on most film and foil laminations are of the emulsion, lacquer, or hot-melt type. The choice will depend primarily on which will give the best lamination and secondarily on available equipment and ease of handling.

APPROXIMATING THE ATTRACTIVE FORCES OF ADHESION FOR GLASS AND OTHER SURFACES. F. Moser. ASTM Bull. No. 169, 62–6 (Oct. 1950). Contact angle studies are described for predicting polarity and adhesion. Compatibility of materials is indicated if the materials studied gave approximately the same contact angle in an otherwise identical material-air-solvent system. Data are presented to show that compatibility and subsequent adhesion of materials can be secured by using 1) a heterogeneous adhesive material with internal compatibility or affinity, which provides both polar and nonpolar functional groups that are compatible with the dissimilar materials, or 2) single-component materials having a polyfunctional molecule with two or more functional groups having selective affinities for dissimilar materials.

RESEARCH ON DENTAL MATERIALS AT THE NATIONAL BUREAU OF STANDARDS. I. C. Schoonover and W. Souder. Nat. Bureau Standards Circular 497, 14 pp., (Aug. 15, 1950). A general account is given of the research and development work in the field of dental materials that is now being conducted at the National Bureau of Standards. Included are noteworthy accomplishments on design and construction of special equipment, the development of specific techniques for evaluating these materials, fundamental research on the chemical and physical nature and behavior of dental products, development of better techniques for use in dental practice, clinical research, and the development of new products for dental use. The relationship of the work to the dental health of the nation, dental industries, dental schools, and the Federal dental services is discussed. A list of 156 Bureau publications on dental materials is included.

PLASTICS. G. M. Kline. Ind. Eng. Chem. *42*, 2001–6; 2050–7 (Oct. 1950). A fourth annual review of developments in the use of plastics as engineering materials of construction. Other articles in this review cover cements, elastomers, fibers, and hard rubber. Data on the properties of these materials are also presented.

CHEMICAL PLANT IN RIGID P. V. C. Brit. Plastics *23*, 80–2 (Sept. 1950). Ducts, tanks, hoods, pipe, and pipe fittings for use in chemical plants are made of unplasticized polyvinyl chloride resin. Methods of fabrication are described.

SQUEEZE-BOTTLE TESTS. A. R. Nielsen and J. H. Parliman. Modern Packaging *24*, 141–4 (Sept. 1950). The permeability rates of polyethylene bottles of various wall thicknesses to water, ethyl acetate, and toluene are reported. The permeability rate, g./24 hr./100 in.^{2}/mil thickness, is 0.149 for water at 100% vapor phase and 0.18 at 100% liquid phase. The corresponding values for ethyl acetate are 8.8 and 20.8, respectively. Toluene has a much higher rate than either of these two. The liquid level is not critical for materials which have a low rate of permeation such as water, but is for materials which have a high rate such as ethyl acetate and toluene. For ethyl acetate the loss in weight per day of the full bottles was inversely proportional to wall thickness. For water and toluene the loss was less than that calculated by this inverse wall thickness rule, indicating a greater efficiency for the heavier walls.

Materials

DIALKYL TETRACHLOROPHTHALATES AS PLASTICIZERS. J. K. Stevenson, L. E. Cheyney, and M. M. Baldwin. Ind. Eng. Chem. *42*, 2170–5 (Oct. 1950). A series of dialkyl tetrachlorophthalates was investigated as plasticizers for vinyl chloride-acetate copolymers. These esters are flame resistant and exhibit practically no tendency to migrate. They are not so efficient as di-2-ethylhexyl phthalate and produce compositions having somewhat poorer low-temperature flexibility. Their apparent efficiency varies somewhat with the method of rating. Efficiency is highest with the lower members of the *n*-alkyl series and decreases as the *n*-alkyl chain increases. Compatibility of the tetrachlorophthalate esters in Vinylite VYDR is excellent until the aliphatic chain reaches eight carbon atoms, when compatibility diminishes. Best flame resistance is obtained with the lower members of the series, but even the octyl tetrachlorophthalates offer considerable flame resistance. The tetrachlorophthalates are not as flame resistant as tricresyl phosphate in mixtures with dioctyl phthalate. The esters are also compatible with several other resins.

TRIFLUOROCHLOROETHYLENE POLYMERS. L. C. Rubin. SPE J. *6*, 7–8 (Oct. 1950). The properties of trifluorochloroethylene polymers are reported.

PLASTICIZERS FROM LACTIC ACID. C. E. Rehberg, M. B. Dixon, T. J. Dietz, and P. E. Meiss. Ind. Eng. Chem. *42*, 2374–5 (Nov. 1950). Thirty-five plasticizers made by acrylating esters of lactic acid with *n*-alkyl chloroformates are described. Boiling points of the plasticizers and compatibilities with cellulose acetate and polyvinyl chloride (95% vinyl chloride copo-

lymer) were determined. Also reported are the tensile strength, modulus at 100% elongation, ultimate elongation, and brittle point of each plasticized vinyl composition. As indicated by modulus and brittle point, many of the esters are more efficient than di-2-ethylhexyl phthalate as plasticizers for the vinyl resin.

DEVELOPING FIELDS FOR PVC SHEETING. T. W. Fazakerley. Brit. Plastics *23*, 91–3 (Sept. 1950). Applications of polyvinyl chloride sheeting and film are described.

COLORANTS FOR PLASTICS. B. J. Mayo, Jr. SPE J. *6*, 5 (Oct. 1950). Colors are listed which have good heat stability, lightfastness, and dispersibility, and are nonbleeding and noncrocking in plastic molding compounds.

EFFECT OF CHEMICALS ON FLUOROTHENE. S. E. Frey, J. D. Gibson, and R. H. Lafferty, Jr. Ind. Eng. Chem. *42*, 2314-17 (Nov. 1950). Fluorothene, the plastic polymer of chlorotrifluoroethylene, has a specific gravity of 2.111 at 25° C., is self-extinguishing, and has very low water vapor permeability and no water absorption. Fluorothene is very resistant chemically and is not dissolved by any reagent at ordinary temperatures. A few reagents, mainly ethers and organic halides, are absorbed by this plastic and this absorption is facilitated by an elevation of temperature. The absorption may reach a saturation value after which further changes are not observed. Logarithmic expressions were found for the rate of absorption of reagents by Fluorothene and for the swelling of the samples during absorption of the reagents.

PHASE EQUILIBRIA BETWEEN FLUOROTHENE AND SOLVENTS. R. E. McHenry, S. E. Frey, J. D. Gibson, and R. H. Lafferty, Jr. Ind. Eng. Chem. *42*, 2317-19 (Nov. 1950). An investigation of the phase equilibria between Fluorothene (chlorotrifluoroethylene solid polymer) and a number of high-boiling solvents was made for the purpose of finding a good solvent for Fluorothene. Of the reagents tested, chlorotrifluoroethylene liquid polymer was found to be the best solvent. An increase in molecular weight of Fluorothene had little effect on the solubility. Other materials gave phase diagrams showing a maximum solution temperature.

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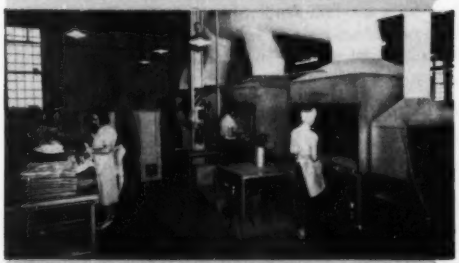

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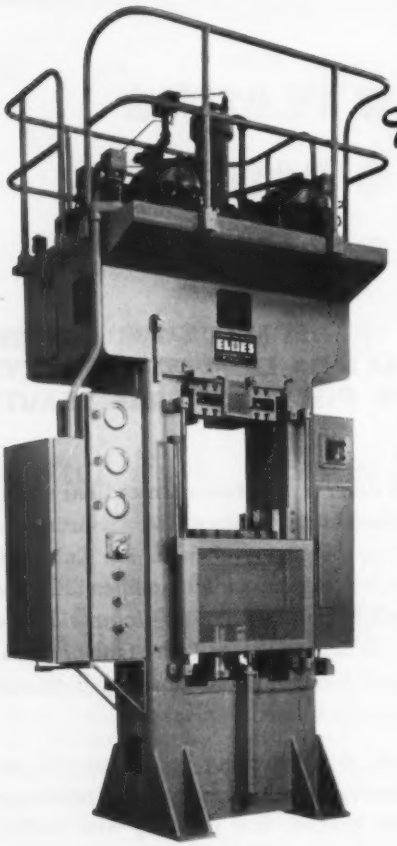

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b. 24-hour water absorption	Less than 0.5% by weight	Less than 0.5% by weight
Light in weight—specific gravity	1.05	1.05
Tensile in Psi	4,400	5,100

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U. S. PLASTICS PATENTS

Copies of these patents are available from the U. S. Patent Office, Washington, D. C., at 25¢ each.

LAMINATING. F. P. Allard (to Shellmar). U. S. 2,523,410, Sept. 26. Laminating machine for continuously forming sheet-like polymerizable product.

REACTION PRODUCT. E. L. Kropa and J. J. Padbury (to American Cyanamid). U. S. 2,523,470, Sept. 26. Reaction products of an aldehyde and an amide of perfluoro-dicarboxylic acid.

AMINOPLASTS. D. E. Nagy (to American Cyanamid). U. S. 2,523,477, Sept. 26. A urea- or melamine-formaldehyde resin and an accelerator such as an unsubstituted acyl guanyl urea salt.

RESINS. M. T. Harvey and S. Caplan (to Harvel). U. S. 2,523,623, Sept. 26. Mixing aniline, an aldehyde, and polymeric cashew nut shell liquid and heat curing.

GLASS FIBER COMPOSITE. J. A. Grant (to Owens-Corning). U. S. 2,523,-759, Sept. 26. Composition of a bitumen and a compatible thermosetting resin and glass fibers.

INTERPOLYMERS. G. W. Stanton and C. E. Lowry (to Dow). U. S. 2.524,-023, Sept. 26. Ternary interpolymer prepared by dispersing and interpolymerizing in water, vinylidine chloride, butadiene, and methyl methacrylate.

CARBOXYMETHYL CELLULOSE. R. W. Swinehart and S. R. Allen (to Dow). U. S. 2,524,024, Sept. 26. Process for synthesizing carboxymethyl cellulose.

FIBERS. C. B. Croston, C. D. Evans, L. L. McKinney, and J. C. Cowan (to U. S.). U. S. 2,524,042, Oct. 3. Curing prolamine fibers with aldehyde in organic medium.

POLYAMIDE RESINS. P. J. Flory (to Wingfoot). U. S. 2,524,045-6, Oct. 3. Condensing an amino acid with a polymeric carboxylic acid.

RESINS. P. H. Rhodes (to Koppers). U. S. 2,524,079-80, Oct. 3. Method of preparing permanently fusible copolymer phenol-resorcinol resins.

RESINS. F. G. La Piana, G. N. Houth, and R. W. Farrell (to Stein, Hall). U. S. 2,524,111-2-3, Oct. 3. Resin composition comprising reaction product of an alpha-hydroxy monocarboxylic acid, a urea or melamine, an aldehyde and a glycol.

POLYMER. E. L. Kropa and J. J. Padbury (to American Cyanamid). U. S. 2,524,228, Oct. 3. Heating a mixture of epsilon-caprolactam and methyl alcohol and isolating the polymer.

CELLULOSE MODIFIER. D. L. Schoene and V. S. Chambers (to U. S. Rubber). U. S. 2,524,399-400, Oct. 3. Chemically combining cellulose or starch with divinyl sulfone.

RESIN. C. H. Parker, Jr. (to American Cyanamid). U. S. 2,524,-472, Oct. 3. Dispersing methylol urea or melamine in butanol, refluxing with acid catalyst under agitation, distilling, and dissolving in xylenol.

POLYMERS. W. E. Cass (to G. E.). U. S. 2,524,513, Oct. 3. Polymers of vinyl 2, 3, 4, 5-tetrachlorobenzoate.

SILICON POLYMERS. R. H. Krieble (to G. E.). U. S. 2,524,529, Oct. 3. Reacting in the presence of a peroxy catalyst an unsaturated hydrocarbon and a silicon hydride.

VINYL COMPOUNDS. W. P. Hohenstein (to Brooklyn Poly.). U. S. 2,524,627, Oct. 3. Polymerizing styrene in aqueous suspension in the presence of tricalcium phosphate.

POLYMERS. P. O. Tawney (to U. S. Rubber). U. S. 2,524,684-85, Oct. 3. Di-2-alkenyl phthalate polymers.

ALLYL STARCH. R. M. Hamilton and E. Yanovsky (to U. S.). U. S. 2,524,-792, Oct. 10. Allylating starch by heating with allyl chloride in the presence of alkali and metal iodide.

DYEING. L. F. Koberlein (to Interchemical). U. S. 2,524,811, Oct. 10. Dyeing plastic articles with dye solution containing plasticizer.

MOLDING. B. S. Thomas. U. S. 2,-524,858, Oct. 10. Injection mold for plastic materials.

POLYMERIZATION. A. White (to I. C. I.). U. S. 2,524,862, Oct. 10. Photopolymerizing unsaturated materials.

RESINS. H. F. Minter (to Westinghouse). U. S. 2,524,921, Oct. 10. Unsaturated esters and synthetic resinous products thereof.

CELLULOSE TITANATE. F. K. Signaigo (to Du Pont). U. S. 2,525,049, Oct. 10. Process for preparing cellulose titanate.

MOLDS. W. C. Lockwood (to Calresin). U. S. 2,525,177, Oct. 10. Flexible mold material containing a vinyl resin, chlorinated terphenyl, and plasticizers.

ION EXCHANGE. C. G. Laube (to American Cyanamid). U. S. 2,525,-227, Oct. 10. Condensate of aminotriazine-formaldehyde and a guanide-aldehyde resin.

CATION EXCHANGE. J. T. Thurston (to American Cyanamid). U. S. 2,-525,247, Oct. 10. Sulfonated cured furfural resin.

PEN SAC. A. L. Rhoton (to Goodrich). U. S. 2,525,272, Oct. 10. Pen sac composed of successive layers of silicone resin, nylon, and latex.

SHEET STOCK. I. J. Novak (to Raybestos-Manhattan). U. S. 2,525,310, Oct. 10. Method of producing resin-impregnated paper-base laminating stock.

PACKAGING. H. Jenett. U. S. 2,525,-358, Oct. 10. Strippable plastic packaging material.

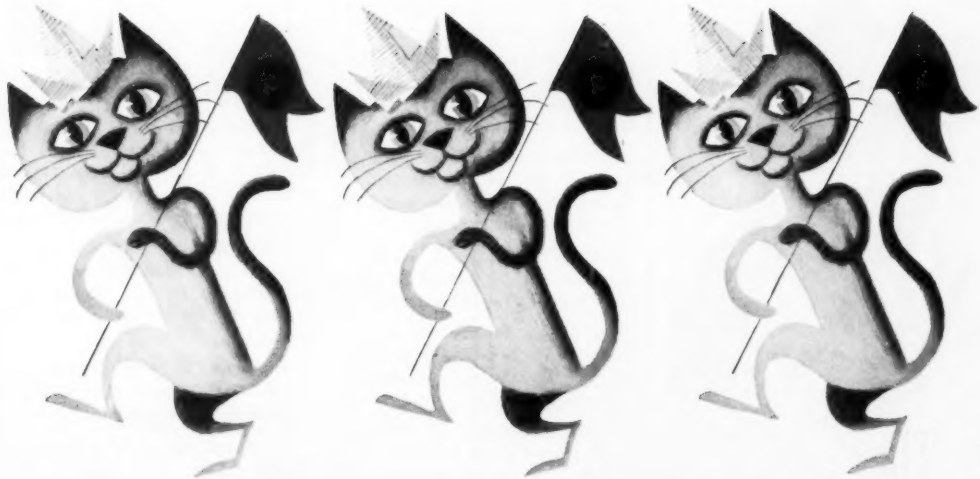
MOLDING. D. Swarovski. U. S. 2,-525,465, Oct. 10. Method of mass production of molded objects.

ION EXCHANGE. J. R. Dudley (to American Cyanamid). U. S. 2,525,-480, Oct. 10. Acid-treated furfural resin ion exchange material.

CELLULOSE DERIVATIVES. K. T. Barkey and J. W. Mench (to Eastman). U. S. 2,525,514, Oct. 10. Partially de-etherified cellulose cyanoethyl ethers.

COPOLYMERS. J. R. Caldwell (to Eastman). U. S. 2,525,521, Oct. 10.

(*Continued on p. 118*)



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VINYLIDENE CHLORIDE. E. C. Britton and W. J. LeFebre (to Dow). U. S. 2,525,643, Oct. 10. Heat stabilized vinyl chloride polymers.

PACKAGING. C. M. Carson (to Wingfoot). U. S. 2,525,649-51, Oct. 10. Packaging with thermo-stretchable heat sealable film material.

COMPOSITE. J. D. D. Ianni (to Wingfoot). U. S. 2,525,655, Oct. 10. Phenol-aldehyde-rubber derivatives.

CASTING. J. Gadsby and A. L. L. Tompsett (to I. C. I.). U. S. 2,525,-664, Oct. 10. Casting by photopolymerization.

ANTISTATIC PLASTIC. G. P. Lee and N. D. MacLeod (to I. C. I.). U. S. 2,525,691, Oct. 10. Polyethylene plastic mixed with an ethylene oxide condensate.

MOLDING. O. H. Smith (to U. S. Rubber). U. S. 2,525,965-6, Oct. 17. Process for making a closed-cell gas-expanded thermoplastic resin article.

POLYAMIDES. L. L. Stott (to Polymer). U. S. 2,525,972, Oct. 17. Fabrication of articles by hot-working polyamides.

POLYMER. E. L. Kropa and J. J. Padbury (to American Cyanamid). U. S. 2,526,078, Oct. 17. Preparing reaction products of ε-caprolactam and a nitrogenous compound.

POROUS BODY. G. J. Wilson (to National Cash Register). U. S. 2,526,-311, Oct. 17. Molded laminate of phenolic resin and rubber.

SEALER. E. Simon and F. W. Thomas (to Lockheed Aircraft). U. S. 2,526,-427, Oct. 17. Heat-resistant polyester resin sealer.

INTERPOLYMERS. P. O. Tawney (to U. S. Rubber). U. S. 2,526,434, Oct. 17. Interpolymers of styrene, an allylic fumarate, and an allyl alcohol.

POLYESTERS. T. L. Gresham and J. E. Jansen (to Goodrich). U. S. 2,526,554, Oct. 17. β-hydroxy carboxylic acid esters prepared by alcoholysis of linear polyesters derived from β-lactones.

PAPER TREATMENT. M. E. Cupery (to Du Pont). U. S. 2,526,638-9, Oct. 24. Paper treated with formaldehyde, and a polymeric polyamine or a hydrogenated butadiene-1,3-acrylonitrile copolymer.

RESINS. A. P. Dunlop and P. R. Stout (to Quaker Oats). U. S. 2,526,-643-4, Oct. 24. Ammonium thiocyanate-furfuryl alcohol-aldehyde resins.

INTERPOLYMERS. A. H. Gleason, P. K. Frohlich, and W. J. Sparks (to Jasco). U. S. 2,526,654-5, Oct. 24. Interpolymers of modified styrene and a diene and wax mixtures therewith.

MOLDING. G. W. Scott, Jr. and G. E. Gard (to Armstrong Cork). U. S. 2,526,697-8-9, Oct. 24. Method and device for molding with dielectric heating.

POLYMERS. W. F. Gresham (to Du Pont). U. S. 2,526,743, Oct. 24. Polymers of unsaturated ethers.

CELLULOSE ESTERS. E. J. Milbrada (to Celanese). U. S. 2,526,761, Oct. 24. Production of cellulose esters.

POLYETHYLENE. R. B. Richards, J. R. Myles, and D. Whittaker (to I. C. I.). U. S. 2,526,773, Oct. 24. Copolymer of ethylene and diallyl oxalate.

MOLDING RESINS. R. Lindenfelser and J. Grabowski (to American Cyanamid). U. S. 2,526,885, Oct. 24. Aniline-melamine-formaldehyde resin having improved electrical properties.

MOLDING. H. C. Gray (to Continental Can). U. S. 2,526,945, Oct. 24. Apparatus for continuously forming shapes of resin impregnated fabric.

RESINS. B. W. Jones (to Pittsburgh Consolidation Coal). U. S. 2,-527,065, Oct. 24. Resinous aldehyde tar acids and hydrocarbon oil condensates.

POLYMERS. J. Ross and A. L. Gebhart (to Colgate - Palmolive - Peet). U. S. 2,527,081, Oct. 24. Condensates of olefins and an α-β-enal compound.

POLYMERS. B. M. Vanderbilt and F. Bascom (to Standard Oil). U. S. 2,527,162, Oct. 24. Copolymers of styrene-acrylonitrile and a diolefin.

COPOLYMERS. E. A. Kern (to G. E.). U. S. 2,527,223, Oct. 24. Copolymers of 2-vinyldibenzofuran.

COPOLYMERS. J. R. Dudley (to American Cyanamid). U. S. 2,527,-300, Oct. 24. Copolymers of unsaturated sulfonic acids and polyunsaturated compounds.

HINGE. F. H. Magnus (to Magnus

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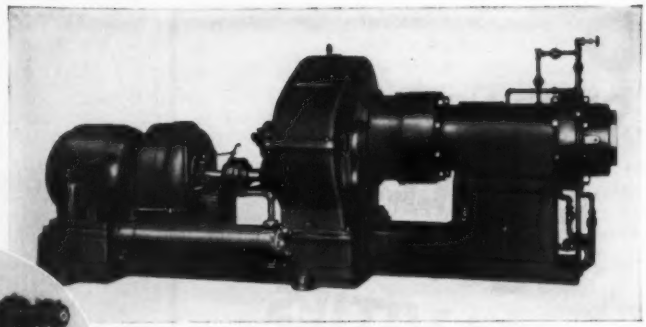

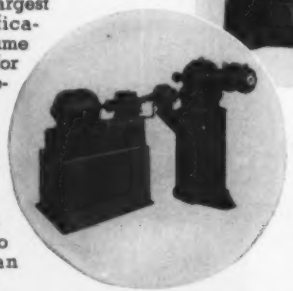

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Research). U. S. 2,527,318, Oct. 24. A plastic hinge construction for boxes.

POLYMERS. C. E. Barnes (to General Aniline). U. S. 2,527,346, Oct. 24. Polymerization of vinyl biphenyl with boron fluoride catalyst.

CONDENSER. W. R. Parson (to Jeffers Electronics). U. S. 2,527,373, Oct. 24. A plastic condenser.

POLYMERS. J. C. Patrick and H. R. Ferguson (to Thiokol). U. S. 2,527,374, Oct. 24. Condensates of a mercapto alcohol and a polycarboxylic acid.

POLYMERS. E. M. Fettes (to Thiokol). U. S. 2,527,375, Oct. 24. Polythio polyhydroxy polymercaptan.

POLYMERS. J. C. Patrick (to Thiokol). U. S. 2,527,376, Oct. 24. A polyacetal polysulfide polymer.

CASTINGS. R. P. Arndt (to Pittsburgh Plate Glass). U. S. 2,527,387, Oct. 24. Forming hollow castings from thermosetting resins.

SHEET MATERIAL. M. A. Chavannes (to Chavannes Industrial Synthetics). U. S. 2,527,398, Oct. 24. Preparing surface-decorated plastic sheets.

POLARIZER. D. P. Cooper, Jr. (to Polaroid). U. S. 2,527,400, Oct. 24. Melamine-formaldehyde surfaced cellulose ester for polarizers.

RESIN. A. F. Fitzhugh (to Shawinigan). U. S. 2,527,495, Oct. 24. Polyvinyl crotonal resin.

RESIN. R. H. Hunt, Jr. (to Monsanto). U. S. 2,527,497, Oct. 24. Polyvinyl-acetal-resinous pine-wood extract composition.

EARTH TREATMENT. J. C. Shearer, A. F. Shepard, and F. W. Less (to Durez). U. S. 2,527,581, Oct. 31. Treating earth formations with liquid mixtures of phenol-aldehyde resin, resorcinol-aldehyde resin, and an aldehyde.

POLYMERS. J. L. Speier, Jr. (to Dow Corning). U. S. 2,527,590, Oct. 31. Polymeric reaction products of a hydrocarbon diisocyanate with a polysiloxane polyhydric alcohol.

CONDENSATES. J. D. Danforth (to Universal Oil Products). U. S. 2,527,709, Oct. 31. Condensates of vinyl esters and aliphatic amines.

RESINS. A. P. Dunlop and E. L.

Washburn (to Quaker Oats). U. S. 2,527,714, Oct. 31. Condensates of furylethylene derivatives and aldehydes.

COATINGS. C. K. Bump and G. H. Bischoff (to Monsanto). U. S. 2,527,793, Oct. 31. Hot melt composition of polyvinyl acetal, hydrogenated castor oil, and dialkyl silicone polymer.

SYNTHETIC WOOD. R. A. Caughey (to Plaswood). U. S. 2,527,795, Oct. 31. Reacting urea and formaldehyde, adding wood waste, and curing to form a rigid article.

SILOXANES. J. T. Goodwin, Jr. (to Dow Corning). U. S. 2,527,808-9, Oct. 31. Organosilicon polymers.

POLYMER. J. R. Johnson (to Du Pont). U. S. 2,527,821, Oct. 31. Mono-olefin-carbon monoxide polymer containing hydantoin rings.

RESIN. P. D. Morton (to Sharples Chemicals). U. S. 2,527,839, Oct. 31. Resinous condensates of sugar carbamates with formaldehyde.

HOT MELT. G. R. Sido and J. F. Murphy (to Monsanto). U. S. 2,527,856, Oct. 31. Hot melts of polyvinyl acetal, hydrogenated castor oil and an aromatic sulfonamid-aldehyde condensate.

ACOUSTIC PANEL. D. Gonda (to Holoplast). U. S. 2,528,049, Oct. 31. Molded hollow panel of thermoset resin-impregnated sheets filled with a sound-absorbing material.

LAMINATES. S. V. Landgraf (to U.S. Rubber). U. S. 2,528,152, Oct. 31. Resin-impregnated fibrous sheets.

LAMINATES. R. M. Paulsen (to U. S. Rubber). U. S. 2,528,168, Oct. 31. Resin-impregnated fabrics.

ION EXCHANGE. R. J. Taylor (to Pfizer). U. S. 2,528,188, Oct. 31. Recovery of streptomycin with cation exchange resin.

MOLDING. R. C. Feagin (to Austenal Laboratories). U. S. 2,528,219, Oct. 31. Molding artificial teeth.

COATING. J. A. Loritsch (to G. E.). U. S. 2,528,235, Oct. 31. Unsaturated alkyd coating, impregnating resins.

RESINS. F. T. Buckley and R. E. Cairns (to Monsanto). U. S. 2,528,337-8, Oct. 31. Compositions of polyvinyl acetal resin and a trialkyl fluorosilane resin.

POLYEPOXIDES. S. C. Greenlee (to

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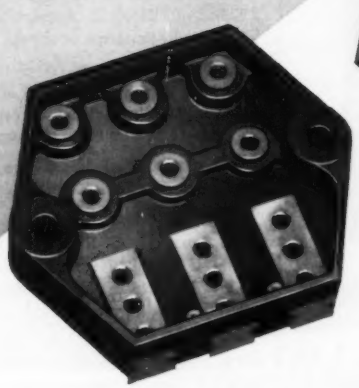

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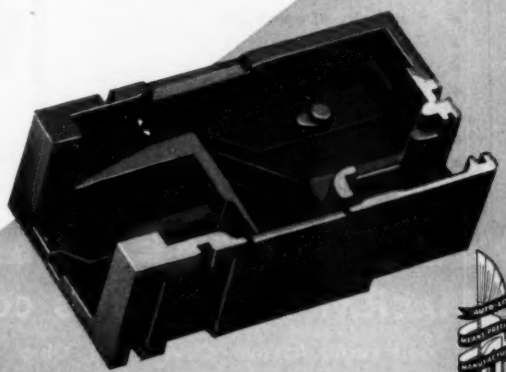

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Devoe and Raynolds). U. S. 2,528,-359-60, Oct. 31. Polyepoxide resins and reaction products thereof with urea and melamine resins.

EPOXY RESINS. T. F. Bradley (to Shell). U. S. 2,528,417, Oct. 31. Epoxy ether-phenolic pitch compounds.

POLYMERS. M. Markarian (to Sprague Electric). U. S. 2,528,445, Oct. 31. Polymers of divinyltetrachlorobenzenes.

POLYMERIZATION. F. E. Condo and C. W. Schroeder (to Shell). U. S. 2,528,469, Oct. 31. Granular polymerization of vinyl chloride.

MOLDING. R. E. Kent (to Du Pont). U. S. 2,528,523, Nov. 7. Extruding and insolubilizing ethylene polymers.

SHEET STOCK. G. A. Lyon. U. S. 2,528,528-9, Nov. 7. Apparatus for forming plastic strips or sheets.

MOLDING POWDER. W. W. Pedersen (to Dow Corning). U. S. 2,528,606, Nov. 7. Molding powder of organosiloxane resin and ethanolamine.

SILOXANES. E. J. Smith (to Dow Corning). U. S. 2,528,615, Nov. 7. Siloxane resin.

POLYMERS. J. C. Richards (to Du Pont). U. S. 2,528,710, Nov. 7. Composition of acrylonitrile, dimethyl formamide, and boron trifluoride.

GLYCIDYL ETHERS. K. T. Wiles and H. A. Newey (to Shell). U. S. 2,528,-932-3-4, Nov. 7. Compositions comprising a mixture of a glycidyl ether of a polyhydric phenol and an epoxy compound.

POLYMERS. C. L. Shapiro (to Acryvin). U. S. 2,529,108, Nov. 7. Polymerizing methyl methacrylate with salicylic acid.

RESINS. J. R. Dudley (to American Cyanamid). U. S. 2,529,142, Nov. 7. Anion exchange resin of melamine treated with dimethylamine.

MOLDING. R. Feitl (to Waldes Kohinoor). U. S. 2,529,146, Nov. 7. Injection molding machine.

POLYMERS. R. R. Harris (to American Cyanamid). U. S. 2,529,214, Nov. 7. Copolymerization of unsaturated alkyd resin in the presence of aromatic sulfonic acid.

TILE BINDERS. P. O. Powers (to Armstrong Cork). U. S. 2,529,260-1, Nov. 7. Tile binder containing coumarone-indene resin or polystyrene.

BOOKS AND BOOKLETS

Write for these publications to the companies listed. Unless otherwise specified, they will be sent gratis to executives who request them on business stationery.

"Proceedings of the First Annual Symposium on Orthopedic Appliances"

Published by Orthopedic Appliance & Limb Manufacturers Assoc., 336 Washington Bldg., Washington 5, D. C. 308 pages. Price $5.00

This is a verbatim report of all proceedings of the First Annual Symposium held at Mellon Institute and the Department of Orthopedic Surgery, School of Medicine, University of Pittsburgh. Included are various discussions of the engineering of appliances for orthopedic use, and of the materials employed in making them. A paper on the desirability of plastics in this connection was given by Dr. R. W. Quarles, Mellon Institute.

"Colloid Chemistry, Theoretical and Applied, Volume VII" Edited by Jerome Alexander

Published by Reinhold Publishing Corp., 330 W. 42nd St., New York, N. Y. 736 pages. Price $15.00

Volume VII of this series presents 43 papers by outstanding authorities in this field. These papers form a part of the larger picture of natural phenomena covered by the complete series.

"A.S.T.M. Standards on Plastics" June 1950. 624 pages. Price $4.85.

"A.S.T.M. Standards on Paint, Varnish, Lacquer, and Related Products." 680 pages. Price $4.85.

"A.S.T.M. Standards on Adhesives" January 1950. 60 pages. Price $1.25.

"A.S.T.M. Standards on Rubber Products" April 1950, 648 pages. Price $4.75.

"A.S.T.M. Standards on Electrical Insulating Materials" January 1950. 660 pages. Price $4.85.

Published by the American Society for Testing Materials, 1916 Race St., Philadelphia, Pa.

These booklets are compilations of the test methods, recommended practices, specifications, and definitions prepared by the A.S.T.M. committees working in these respective fields. Used together with the 1950 annual reports of these committees, they comprise a convenient record of the latest standards pertaining to these materials.

"Neue Ergebnisse der Kolloidwissenschaft" edited by F. Horst Muller.

Published by Verlag von Dr. Dietrich Steinkopff, Frankfurt/Main, Germany. 184 pages. Price DM 24.

New results in the field of colloid science are reported in this compilation of the papers and discussions presented at the 14th meeting of the Kolloid-Gesellschaft. The contributions by authors from the principal countries of Europe include several on the colloidal properties of high polymers. It is noteworthy that this is the first postwar conference of the Society, a further bit of evidence that German scientists are also making progress in the gigantic reconstruction job in their country.

"Structural Plastics" by H. C. Engel, Charles B. Hemming, and H. R. Merriman.

Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y. 301 pages. Price $4.50.

Asserting that considerable confusion exists in the minds of technical personnel dealing with structural plastics, the authors have set as the objective of this work the establishment of a common meeting ground on which divergent viewpoints can be reconciled. With this in mind, the book has sought to encompass the following: coverage of high-strength plastics, providing information for designing and fabricating plastics products; viewing both the merits and demerits of using plastics for specific purposes; comparing plastics to other construction materials; and describing sandwich and honeycomb construction, low-pressure molding, laminating methods, structural adhesives, etc. The foregoing has been presented with the assistance of numerous graphs, curves, and photographs, and is supplemented with an analysis of test methods for determining the strength and suitability of plastics for many phases of fabrication operations.

Although attempting to be all-inclusive in the field it approaches, the book is incomplete in three major respects: consideration of acrylics and resin pulp materials has been omitted; the section on low-pressure molding using male and female molds has been treated too lightly, in view of the vast potential of this class of molding; and the section devoted to no-pressure molding has been underplayed.

Aside from these omissions, the book represents a comprehensive examination of the three factors which the authors hold responsible for the failure of plastics to achieve a sound position among engineering materials employed in load-bearing structures. These are: certain inherent structural shortcomings of almost all plastics; fabricating difficulties encountered in utilizing a new class of materials; and ignorance of the limitations of plastics coupled with a tendency to use them at every turn.

Glacial acetic acid—Physical and chemical properties, latest specifications on the standard, C. P. and U. S. P. grades, and shipping and handling information on glacial acetic acid are presented in detail in this bulletin. Procedure is given for handling and unloading of tank cars. *Niacet Chemicals Div., 993 Niagara Building, Niagara Falls, N. Y.*

A simplified guide to Bakelite and Vinylite plastics and resins—The various forms of the company's phenolic, styrene, polyethylene, and vinyl plastics and resins are classified under 14 major headings in this 24-page booklet. It describes in simple terms the general characteristics and properties of each form, and pictures examples of typical applications in 126 photographs. *Bakelite Div., Union Carbide and Carbon Corp., 300 Madison Ave., New York 17, N. Y.*

Electric feedrail, Catalog No. 25—Illustrations, text, and charts in this 64-page catalog, describe the company's prefabricated electrical distribution system which provides power and light outlets throughout its length. Special sections devoted to planning, layouts, installations, and

(*Continued on p.* 129)

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specifications facilitates the selection of equipment by those who plan and specify electrical installations in operations involving cutting, sewing, portable tools, materials handling, cranes, and hoists. *Feedrail Corp., 125 Barclay Street, New York 7, N. Y.*

How to label plastic products for profit—Addressed primarily to proprietary plastics manufacturers, this 34-page booklet is also of interest to custom molders or fabricators, retail buyers and merchandisers, and advertising and editorial writers. The specific problems examined include how to increase sales through a positive informative labeling program; how to build the program; how to develop the label and define what it should say; how to describe the product; and how to promote the completed informative labeling program. *Informative Labeling Committee, Society of the Plastics Industry, Inc., 295 Madison Ave., New York 17, N. Y.*

Textolite plastics surfacing—The colors and patterns in the company's line of laminates, which has been awarded the 1951 Fashion Academy Gold Medal for distinctive styling, are illustrated in full color in this 16-page bulletin. Home applications, including kitchen counters, dinette tables, and bathroom lavatory vanities, are described, and complete construction details are given. A section devoted to properties lists the abuse-resisting characteristics of the material. *General Electric Co., Pittsfield, Mass.*

Lacquer for molded styrene—The company's newest development, an improved styrene finish with high gloss and strong adhesion, is described in this booklet. Improved characteristics of the new lacquer are outlined. *New England Lacquer Co., King Philip Rd., E. Providence, R. I.*

Phthalate plasticizers—Technical data sheets cover three phthalate ester plasticizers of special interest to the vinyl resin, rubber, and protective coatings industries: PX-104, dibutyl phthalate; PX-108, diisooctyl phthalate; and PX-138, dioctyl phthalate. The sheet on each product includes a table of properties of the pure compound, a description of the product's uses, and an indication of

the compatibility of each plasticizer with various natural and synthetic resins. In addition, sales specifications and full commercial information regarding containers, shipping points, and drum color code are given. *Pittsburgh Coke & Chemical Co., Grant Building, Pittsburgh, Pa.*

New chemicals—Data on several new chemicals which have become available from the company's research laboratories during the last year, and on which separate bulletins have been issued, have been compiled in a bulletin called Collective Volume II. Some of the chemicals covered are: beta-substituted propionitriles, 3-substituted propylamines, dipropionitriles, 2-nitrodiphenylamine, 2-aminobenzenethiol, anti-oxidant 2246, and sodium dicyanamide. *New Products Development Dept., American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y.*

Molding thermosetting plastics—The origins and growth of automatic molding, from the hand to the fully automatic press are traced in this 24-page brochure. Cost savings by automatic molding are described and typical applications are illustrated. The advantages of the system are discussed—parts uniformity; low mold cost; low labor cost; less molding time; material savings; minimum investment; and controlled inventory. *F. J. Stokes Machine Co., 5900 Tabor Rd., Philadelphia 20, Pa.*

Resin 510 in adhesives and coatings—This resin, a low-molecular weight hydrocarbon, has been thoroughly tested by the firm's research staff. and their findings, along with those of other companies, comprise the information presented in this 20-page brochure. Charts and graphs supplement the text. *R-B-H Dispersions, Div. of Interchemical Corp., Bound Brook, N. J.*

Synthetic resins, Bull. 47—Supplementing previously issued bulletin No. 44 on plastics, this booklet offers translations of the latest German patent applications in the field of synthetic resins. Featured is a wartime patent describing the preparation and applications of dimethane sulfonylimide. In addition, a number of post-war patent applications from Germany filed within the last 3 years

are listed. *Research Information Service, 509 Fifth Ave., New York 17, N. Y.*

Stabilizers and lubricants for plastics-Report S-3—Designed to acquaint formulators with the company's line of stabilizers and lubricants for polyvinyl chloride plastics, this reference sheet includes general information along with listings of the important properties of the materials. *Witco Chemical Co., 295 Madison Ave., New York 17, N. Y.*

Industrial thermocouples—Standard models of industrial thermocouples, assemblies and parts are covered in a separately-published eight-page section of the company's catalog. The selection of thermocouples and accessories is discussed, and the company's models are illustrated with complete specifications. *Thermo Electric Co., Inc., Fair Lawn, N. J.*

Heat-resistant cast acrylic sheet—Tested information on the properties and behavior of Plexiglas II heat-resistant cast acrylic sheet, is presented in a five-page bulletin, Design & Fabrication Data 68. The material, which withstands maximum continuous service temperatures in the range of 175 to 185° F., is being used increasingly in aircraft, automotive, and industrial glazing, and in sign and outdoor applications. Advice on design stresses, recommended fabricating and forming techniques, and the design of molds for forming sheets of the heat-resistant material are included. Data on methods of cementing and approved formulations for cements are given in detail. *Plastics Dept., Rohm & Haas Co., Washington Sq., Philadelphia, Pa.*

Practical methods of machining laminated plastics—Information on design and machining techniques, with emphasis on economy, efficiency, and precision is contained in this six-page folder illustrated with 12 photographs and eight detailed diagrams. Included are such data as tool speeds and recommended machine setups for circular sawing, band sawing, turning and boring, threading, drilling, and milling. Other sections describe automatic screw machining, gear cutting, punching, and machining of glass-base material. A full-page chart on the firm's sheet standards lists 18 performance rat-

ings for each of 17 grades of the laminated plastics. *Synthane Corp., Oaks, Pa.*

Progress through wood research for national defense and industry—Many significant advances that have been made in wood utilization and quality control during the last decade are incorporated in this 16-page booklet. Topics covered include improvement of existing products, development of new ones, perfection of wood-working techniques, and the training of technical personnel in the practical aspects of wood research. *Timber Engineering Co., 1319 18th St., N. W., Washington 6, D. C.*

Pressure-sealing zipper—A description of installation procedures is an important highlight of a new eight-page bulletin covering the firm's pressure-sealing zipper, an arrangement of overlapping rubber lips on slide fasteners. The combination of rubber and metal is said to provide a complete seal against gases and liquids ranging from zero pressure to the structural strength of the particular fastener used. Detailed drawings show the six styles in which the zippers are made, along with a discussion of the proper method of selecting the correct style for particular applications. *The B. F. Goodrich Co., Akron, Ohio.*

Outline of the history of chemistry—The evolution of this science starts with pre-Christian origins in India, China, and Egypt, and continues to the present day. The outline, in the form of a flow sheet, consists of two charts printed side by side. Hundreds of entries on the two charts are arranged chronologically, with interconnecting lines to indicate relationships between men, theories, laws, and discoveries. *Mallinckrodt Chemical Works, St. Louis 7, Mo.*

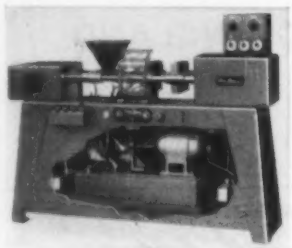
Styrene-loaded glass mat—Technical details of the styrene-loaded glass mat, a new, low-cost thermoplastic structural material, are covered in this bulletin. Discussed are production by the continuous and dipping processes, molding conditions, properties, and coloring. The new product, designed to provide fabricators with an inexpensive, easily handled material for manufacturing articles previously limited to complex molding techniques, is recommended for molding trays, housings, decorative paneling, structural laminates, and containers. *Monsanto Chemical Co., Springfield, Mass.*

Emery bulletin—Physical and typical characteristics of the company's 12-hydroxystearic acid, an 18-carbon saturated fatty acid with a hydroxyl grouping, and hydrogenated castor oil, a hydrogenated triglyceride, are covered in this booklet. Recommended uses based on preliminary experimentation are also discussed. In addition, a complete bibliography is included for each material. *Emery Industries, Inc., Carew Tower, Cincinnati 2, Ohio.*

Agitating and mixing equipment—Specifications, operation, and application information are provided in this new 32-page catalog for the company's Typhoon portable power mixers, agitator-mixer assemblies, Uni-power agitator-mixer drive, side-entering agitators, and acid-resistant linings for mixers and other processing tanks and equipment. *The Patterson Foundry & Machine Co., East Liverpool, Ohio.*

NEW MACHINERY AND EQUIPMENT

INJECTION PRESS—Mass production of small plastic parts at low cost is the objective of a semi-automatic plastic press, introduced by The Van Dorn Iron Works Co., 2685 E. 79th St., Cleveland 4, Ohio. The press, known as Model H-200, has a 2-oz. capacity, and will mold practically all thermoplastics including nylon. Simplified controls, easily accessible to the operator, permit work to be set up rapidly; operating costs are kept to



a minimum. The new press is equipped with variable voltage transformers, mounted on the rear panel.

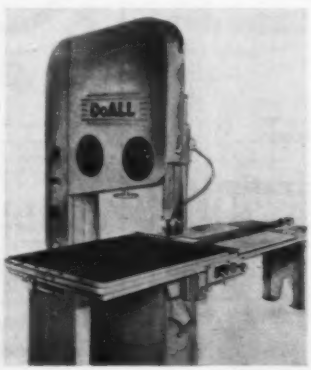
Other important specifications include: plasticizing capacity of 12 lb. per hr.; six operating cycles per min.; maximum mold size, 8 by 10 in.; casting area, 20 square inches.

COMPACTING PRESS—Low-cost, trouble-free operation is the specific objective of two Baldwin-Defiance compacting presses—Models 20 (75-ton capacity) and 45 (200-ton capacity)—manufactured by The Baldwin Locomotive Works, Philadelphia 42, Pa. Both machines, designed for the plastic, ceramic, and powdered-metal fields, provide instantly adjustable speeds from 30 to 60 strokes a minute.

Other highlights include: balanced pressure, assured by the use of four tie rods; automatic lubrication provided by an independently driven oil pump electrically interlocked with the press motor; simple adjustments through an arrangement which permits changes of density or weight while the machine is running; and a cam-controlled feeder, reducing the tendency of fine and coarse particles to segregate and assuring more uniform tablet weights. Both presses are adaptable equally well to multi-cavity dies for small tablets, large dies for slugging operations, or the pressing of irregular shapes. Model 20 has a maximum tablet diameter and length of 3 and 6 in., respectively, while Model 45 has a maximum tablet diameter of 4 in. (with two cavities) and maximum length of 8 inches.

BANDSAW—Demand for a band machine capable of production cutting of heavy and bulky materials—plastics, steel, wood, etc.—has resulted in the development of the HP-36 Hydro-Feed bandsaw by The DoALL Co., Des Plaines, Ill. The saw has a table feeding stroke of 36 in., with 200 lb. pressure available. Correct feed pressure is automatically controlled by the resistance of the work as the saw encounters changing material thickness. The infeed rate is controllable up to 18 ft. per min. with quick return.

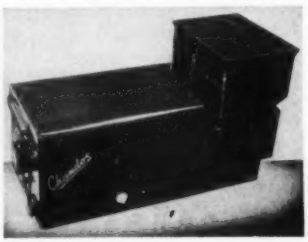
This saw uses a 10-hp. drive motor. It has a three-speed transmission and overload-protected Speedmaster



variable drive which offers a tool speed range of 40 to 10,000 ft. per minute.

DRYER-PREHEATER—The Chandos Rotary Dryer and Preheater, for which world distributing rights were recently taken over by R. H. Windsor Ltd., Royal London House, 16 Finsbury Sq., London, E.C.2, England, is designed for drying and preheating cellulose acetate, polyvinyl chloride, granular acrylic, and other plastic materials. Available in four sizes, ranging in capacity from 50 to 400 lb. per hr., the equipment insures a constant supply of material.

The product to be processed is



charged into a hopper from which it is fed in a regulated flow to a specially designed revolving drum or drums. In transit along longitudinal vanes, the material is cascaded constantly to provide uniform drying and preheating.

OIL-HYDRAULIC PRESS—Fast action with high-tonnage pressure under accurate, regulative control are major advantages claimed for the new 50-ton Multipress oil-hydraulic press recently announced by The Denison Engineering Co., 1160 Dublin Rd., Columbus 16, Ohio. Flexible application to varied industries is made possible by the equipment's precision adjustment for multiple ram action.

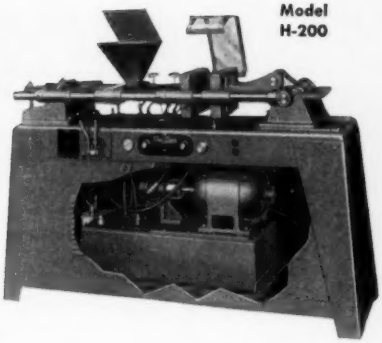
The new 50-ton press has a 15-in. stroke, 24-in. daylight opening, and a work surface of 31 by 19½ in.; it thus has large die space in keeping with higher tonnage capacities. Approach of the ram to work is variable and can be preset at any speed desired up to a maximum of 290 in. per min., with pressing speeds up to 145 in. per minute. The equipment is available in manual and automatic models for single cycling, continuous cycling, or vibratory repeat strokes.

Model H-200

SEMI-AUTOMATIC INJECTION PRESS

2-oz. capacity. Van Dorn's engineering experience has scored again with this leader among all injection presses of its class. Its ultra-modern design insures faster operating cycles—up to 6 per minute. Push button controls are safe, simple and convenient. Accurate temperature regulation. Ruggedly built, compact and quiet.

Model H-200



Power Operated, Lever Controlled Presses—Available in 2-oz. or 1-oz. models. These profit-makers feature: Rugged all-welded construction; built-in safety devices; heating chamber with ample plasticizing capacity.

VAN DORN

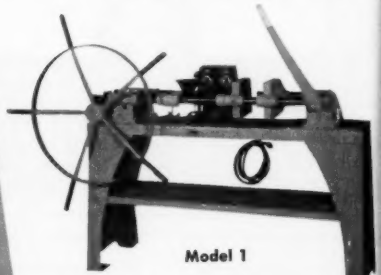
Plastic Equipment

COSTS LESS to Buy...to Operate!

Van Dorn presses are *unexcelled in efficiency* and *unequalled in economy* on the innumerable jobs where a 2-oz. injection is ample. Costwise, Van Dorn presses are outstanding for these reasons:

1. **Surprisingly low in price**
2. **Operate 8 hours for a few dollars**
3. **Use less expensive molds**
4. **Easily set up by one man in a few minutes**

These presses mold practically all thermoplastics including nylon . . . Look over the Van Dorn presses and plastic equipment shown—*then write for detailed Bulletins on individual machines.*

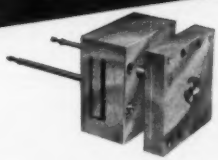


Model 1

Manually Operated Press
1-oz. capacity. Ideal for smaller jobs, experimental work, training.

Plastic Grinder
Grinds up rejects, waste, etc., for re-use. Ruggedly made, easily cleaned.

Model G-100



Mold Bases
. . . Available from stock for all Van Dorn presses.

THE Van Dorn IRON WORKS CO.
2687 EAST 79th STREET • CLEVELAND 4, OHIO
Cable Address: "VANDORN" Cleveland

Production of

FOR the purpose of this report, production is the sum of the quantities of materials produced for consumption in the producing plant, for transfer to other plants

PLASTICS AND SYNTHETIC RESIN PRODUCTION From Statistics Compiled

Materials	*Total prod'n. first 10 mos. 1950*	*Total sales first 10 mos. 1950*
CELLULOSE PLASTICS:[a]		
Cellulose acetate and mixed ester plastics:		
Sheets, continuous:		
Under 0.003 gage	9,926,462	9,998,000
0.003 gage and over	8,648,104	8,868,621
All other sheets, rods, tubes	3,791,082	3,386,362
Molding, extrusion materials	68,133,582	66,454,659
Nitrocellulose:		
Sheets	5,171,556	5,258,879
Rods and tubes	1,350,575	984,353
Other cellulose plastics[b]	10,250,477	10,811,411
PHENOLIC AND OTHER TAR ACID RESINS:		
Laminating	58,698,564	40,602,563
Adhesives	24,784,576	22,463,905
Molding materials[a]	181,236,240	158,055,192
Protective coatings (containing less than 10% modifier)	19,008,782	15,237,768
Miscellaneous uses (including casting)	53,994,927	51,391,597
UREA AND MELAMINE RESINS:		
Adhesives	63,804,342	61,134,637
Textile- and paper-treating resins	23,355,007	18,753,365
Protective coatings, modified and unmodified	24,453,509	21,090,735
Miscellaneous uses, including laminating and molding[c]	56,427,337	55,497,302
STYRENE AND STYRENE DERIVATIVE POLYMER AND COPOLYMER RESINS:		
Molding materials[a]	212,604,450	223,684,588
Miscellaneous uses[d]	103,755,344	38,934,926
VINYL RESINS:		
Sheeting and film, including safety-glass sheeting[a]	187,431,174	178,239,225
Adhesive (resin content)	14,997,353	13,741,760
Textile- and paper-treating resins, including spreader and calendering types (resin content)[e]	37,645,195	37,285,413
Molding and extrusion material (resin content)	93,077,564	91,643,860
Miscellaneous uses (resin content)[e]	18,677,120	11,862,848
MISCELLANEOUS SYNTHETIC PLASTICS AND RESIN MATERIALS:		
Molding materials[a, f]	49,642,531	49,092,297
Protective coatings[g]	59,534,576	59,875,081
All other uses[h]	103,193,065	169,993,438

[a] Includes fillers, plasticizers, and extenders. [b] Includes sheets, rods, and tubes, and molding and extrusion materials. [c] Data on resins for laminating and miscellaneous uses are on a dry basis; data on molding materials are on the basis of total weight. [d] Excludes data on protective coating resins; these data are included with miscellaneous coating resins to avoid disclosure of

Plastics Materials

of the same company, and for sale. Sales include only the quantities involved in bona fide sales in which title passes to the purchaser.

IN POUNDS FOR SEPTEMBER AND OCTOBER, 1950 by U. S. Tariff Commission

September 1950		*October 1950*	
Production	*Sales*	*Production*	*Sales*
1,012,422	1,006,827	1,158,409	1,210,802
1,273,172	1,211,904	1,167,886	1,274,929
433,469	392,883	504,523	495,418
7,247,793	7,519,190	8,642,684	8,457,410
506,143	554,996	584,696	614,977
132,034	114,817	126,493	120,895
1,149,569	1,321,289	1,329,472	1,461,920
6,693,975	4,348,276	7,348,530	5,615,904
2,944,039	2,863,263	2,826,325	2,631,872
20,472,031	21,309,232	19,828,118	18,866,128
2,232,159	1,721,864	2,658,822	2,124,823
6,794,605	6,177,832	6,056,494	5,792,371
7,399,430	7,583,446	7,714,369	6,967,087
2,256,759	2,144,304	2,703,807	2,370,674
2,561,095	2,168,679	2,816,791	2,273,205
6,580,390	7,353,453	6,240,096	7,514,826
24,545,665	22,906,116	24,324,689	25,457,751
4,831,404	4,145,540	5,444,128	4,457,788
18,498,346	20,940,013	21,622,481	20,208,345
1,816,120	1,597,962	1,250,222	1,162,720
3,682,165[i]	4,107,590	4,211,734	4,081,799
9,309,310	10,348,358	9,926,629	10,490,519
1,831,953	1,702,167	2,024,612	1,424,960
5,753,532	5,303,720	6,196,471	6,432,788
7,261,544	7,069,015	7,609,208	7,704,660
19,139,953	19,129,393	20,610,877	20,626,239

operations of individual companies. [e] Includes data for spreader and calendering type resins. [f] Includes data for acrylic, polyethylene, nylon, and others. [g] Includes data for coumarone-indene, petroleum, silicone, and other protective coating resins. [h] Includes data for acrylic, alkyd, coumarone-indene, nylon, petroleum, silicone, and others for miscellaneous uses. [i] Revised.

INTERNATIONAL PLASTICS NEWS*

Activities Around the World of Interest and Importance to the Plastics Industry in the United States

Expert to Visit India—The conversion of India's vast supply of available raw materials into economical and effective plastics will be the object of a scientific and industrial coordination tour which will be made during the next six months by Dr. W. Peter Hohenstein, adjunct professor of chemistry at the Polytechnic Institute of Brooklyn. Dr. Hohenstein's work is part of a program to better the standards of living through bringing the research of other industrialized countries to bear on the industrial possibilities of India.

Dr. Hohenstein was a member of the Planning Committee for the Weizmann Institute of Science in Israel and represented the committee in Israel during the institute's construction and equipment planning. While in India, Dr. Hohenstein will supervise the opening and installation of a textile research institute in Ahmedabad.

New fiber plant—A plant is to be built by Imperial Chemical Industries Ltd., at Wilton, Yorkshire, England, for the commercial production of the new Terylene polyester-type continuous yarn and staple fiber.

The polymer from which Terylene fiber is made is a condensation product of ethylene glycol and terephthalic acid which will also be made at Wilton from products of the new I.C.I. oil-cracking plant. Terylene is one of the few new synthetic yarns known to be anywhere near the stage of commercial production in Europe. Another is Ardil, a protein-based fiber, to go into production at another I.C.I. plant at Dumfries early in 1951. At present, Terylene is in production at the rate of several hundred long tons annually at a pilot plant. In about five years, when full production is reached at Wilton, output will be about 11.2 million lb. a year, with capacity for expansion.

Terylene fiber will be produced as continuous filament and as staple fiber. It is a pale ivory shade, circular in section, smooth, lustrous, and strong. The continuous fiber, which is twice as strong as cotton and is little affected by most acids, weaves into a silk-like fabric which has a soft hand and drapes well. Knitted articles are warm to the touch, can be easily washed and dried, and require no ironing.

Fabrics made from staple on the worsted system look and feel like wool. Crease resistance is outstanding, but hot-pressed creases are retained for months. Dyeing at first proved difficult, but the problem has been overcome. The applicable dyestuffs are certain dispersed acetates and some of the azoic series.

The polymer itself can also be dyed so that colored yarns can be produced by extrusion. Excellent results can be achieved in printing with suitable dyestuffs. Among materials produced successfully in Terylene have been ropes, fishing lines, filter cloths, sewing threads, lace, nets, curtains, tablecovers, lingerie fabrics.

Plastics in Far East—R.E.G. Windsor, of R. H. Windsor Ltd., London, has recently returned to England from a world tour, during which he studied the plastics industries and plastics machinery sales prospects in India, Pakistan, Australia, Japan, U.S.A., and Canada. He reports that Japan will soon become an important factor in the plastics world. Australia, with a well-established industry, will probably be the first to reach a high level of technical efficiency in the thermoplastic as well as the compression field, but Japan undoubtedly possesses the requisite technical knowledge and skill.

The industry in Japan is currently based mainly on p.v.c., with four or five principal plants in production. Sheet quality is not high but printing is good.

Mr. Windsor reports that both India and Pakistan are greatly interested in the development of plastics industries, and Pakistan possibly has slightly better chances of establishing a modern thermoplastics industry because she is only now entering the field. In India there has already been much compression molding. In neither country are there any extruders in significant production. Both will be handicapped for the time being by the difficulty of recruiting technically skilled labor. But Mr. Windsor was impressed by the determination in many quarters to found a modern plastics industry.

One trend observed during the 40,000-mile trip, said Mr. Windsor, was the slackening off in the demand for the larger output injection machines because of the growing shortages of materials.

Jamaica—Under the policy of developing new secondary industries, the Governor of Jamaica, British West Indies, has given notice that the plastics industry is to be declared a "pioneer" industry, and as such will enjoy important reliefs from taxation and import duties on machinery and raw materials. It does not necessarily follow that a plastics industry, or even one factory, has already been established on the island, but simply that if founded it will be given appropriate government backing. A wide range of plastics consumer goods is named in the order, from combs and eye-glass frames to bottle stoppers, brush backs, lipstick cases, and electrical accessories.

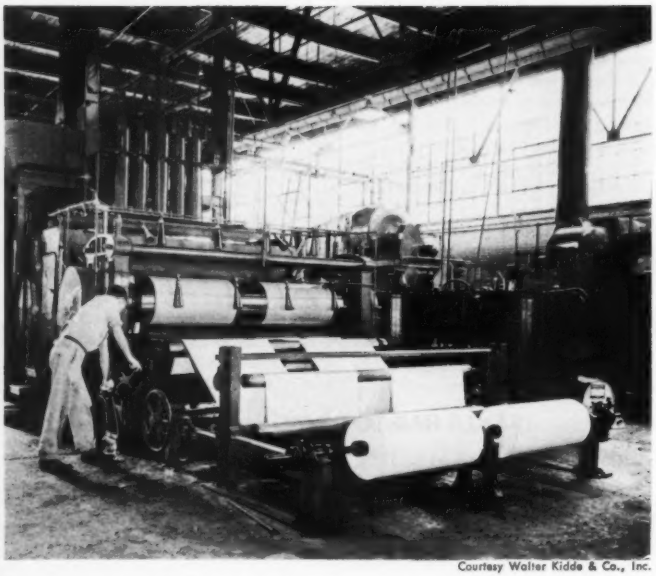
Polystyrene Plant—Monsanto Chemicals (Australia) Ltd. plans to build a plant for the production of polystyrene at Melbourne. It is to cost about $750,000, and will be the first in Australia. The monomer will be imported from Texas City, Texas.

Melamine Plant—Beetle-Elliott Co., Sydney, N.S.W., has acquired patent rights for Australia on the manufacture of melamine resins in powder form. Production will be started in a plant at Rozelle, N.S.W.

Silicones in Germany—The manufacture of silicones has been commenced by the firm of Alexander Wacker, Munich.

Swedish Urea—Full production of urea has begun at the new Heroya factory of the Norske Hydro concern in South Norway. Output is about 30 tons a day.

* Reg. U. S. Pat. Office



Courtesy Walter Kidde & Co., Inc.

In fire extinguishing system for laminate plant, CO_2 nozzles (visible in front of and above impregnating machine rolls) are aimed at resin-alcohol dip tank—a major hazard

Fire Protection in Laminate Plant

WHEN the various base materials used by Synthane Corp., Oaks, Pa., to produce its laminates are saturated or impregnated with resins in an alcohol solvent, a fire hazard is presented. Although the bath is kept below the critical temperature of the alcohol solvent, there is constant danger of flash fire in the escaping fumes, which might be ignited by static electricity or a spark. Because of the rapid spread and intense heat of such a fire, manual extinguishing is too slow and too limited.

To provide a dependable fire extinguishing system, Walter Kidde & Co., Inc., Belleville, N. J., designed a tailor-made carbon dioxide fire smothering installation that eliminates the threat of serious fire, yet does not interfere with the operation of the machinery.

The Kidde system is automatic, operating 24 hr. a day. Typical of the three separate systems protecting Synthane machines is one served by a bank of 50-lb. capacity carbon dioxide cylinders. CO_2 is stored in the cylinders as a liquid under pressure of 850 p.s.i. The cylinders, which have automatic valve release mechanisms, are manifolded together for simultaneous discharge in case of emergency.

Nerve center of the extinguishing system is a link-type heat detector located above the impregnating bath. Should fire break out in the flammable bath, the detector automatically actuates the cylinder-release mechanism. When released from the cylinder bank, the CO_2 rushes through piping, under its own power, to a series of 10 discharge nozzles aimed directly at the surface of the impregnating bath. As it hits the air, the CO_2 becomes a gas, expands to 450 times its stored volume, and completely envelopes the surface of the threatened area.

By excluding air from the fire area, the inert gas quickly and safely extinguishes the conflagration. Being inert, the CO_2 cannot adulterate the chemical bath, or harm the machine or the fabric passing through it, and it leaves no messy residue. As an added safety feature, the system throws an explosion-proof switch which shuts down all electrical machinery. A manual release can be used to operate the system.

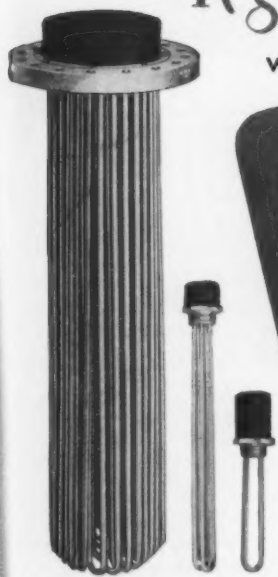
HEAT GASES AND LIQUIDS

Efficiently and Economically

"*Right on the Job!*"

with

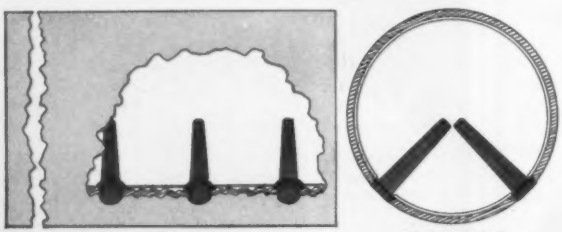
CHROMALOX *Electric* **IMMERSION HEATERS**



TMO Type Immersion Heaters are made in sizes up to 75 KW to operate in temperatures up to 800° F. and pressures up to 600 pounds.

CHROMALOX Tubular Immersion Heaters are used for heating compressed air and other gases: for super-heating steam; for heating liquids and Dowtherm, Prestone and similar heat-transfer mediums. They can be readily applied to high-temperature and high-pressure operations.

CHROMALOX Electric Immersion Heaters give you the *exact* temperatures you require and maintain these temperatures accurately. Dependable performance, economical operation, reduced spoilage are among other advantages gained by using these easy-to-install heaters.



GIANT STEAM ACCUMULATOR USING CHROMALOX IMMERSION HEATERS (SIMPLIFIED VIEW)

Twenty-four TMO Heaters of 24 KW each are used in this steam accumulator (approximately 72 feet long, 8 feet diameter) to maintain 300° F steam temperature.

This installation was worked out on the job by Chromalox Application Engineers who are always ready to help solve your heating problems.

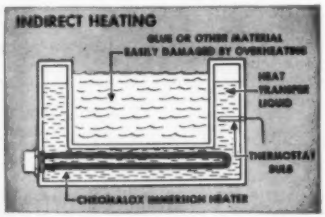
CHROMALOX

Electric Heat for Modern Industry

EDWIN L. WIEGAND CO. • 7503 Thomas Boulevard • Pittsburgh 8, Pa.

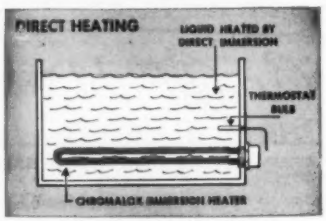
Typical Examples

of a few of the many uses for Chromalox Immersion Heaters



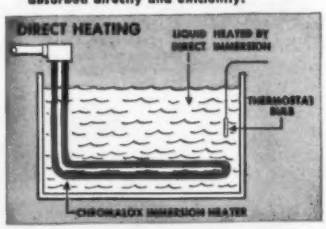
WATER OR OIL JACKETED KETTLES

Heaters are quickly and easily mounted in kettle wall; temperatures are accurately maintained manually or by automatic control. Uniform heat transfer makes this application particularly good for liquids that must be heated slowly to prevent damage by overheating.



HEATER MOUNTED PERMANENTLY IN TANK

Chromalox Immersion Heaters are welded or bolted through tank wall. Heaters are sheathed in copper, steel or alloy—as required to defeat corrosion. Temperatures are controlled thermostatically. Heat is absorbed directly and efficiently.



FOR HEAVY-DUTY IMMERSION HEATING

Low-density Immersion Heaters are especially designed for high-temperature molting-pots or salt baths. Heaters have legs to raise elements above sludge accumulation. They are quickly installed and easily removed for maintenance.

Want more Examples?

Request the fully-illustrated booklet "100 Ways to Apply Electric Heat." It contains photographs and drawings showing Chromalox Electric Heaters at work in plants throughout the United States. Write today for your copy.

IC-41

He's *Watching a Wedding* of metal and plastic

IN this high vacuum coating chamber, metal evaporates from a heated crucible and condenses on molded plastic items or sheeting. Result: precious metal lustre at dime-store price—beautiful enough for the appointments of a fine automobile, uniform enough for the condensers in America's telephone system.

DPi not only supplies all the equipment you need for the process but works closely with manufacturers in selecting undercoating and overcoating lacquers and the best procedure for each particular production problem.

The high vacuum chambers used for metal deposition are available in a large variety of sizes from a simple 12-inch glass jar to a stainless steel chamber 4 feet in diameter and nearly 5 feet long, complete with versatile electrical connections and instrumentation. Industry is using them profitably in many applications besides coating—high altitude studies, experimental design of electronic tubes, exploration of new production techniques in impregnation that would never have been practicable before high vacuum became so economical to obtain.

We've prepared a new data sheet that gives full engineering details about DPi's line of high vacuum chambers. That and an article discussing the technique and economics of metal coating on plastics are yours for the asking. Write ***Distillation Products Industries,*** Vacuum Equipment Department, 779 Ridge Road West, Rochester 3, N. Y. (Division of Eastman Kodak Company).

DPi

high vacuum research and engineering

Also . . . vitamins A and E . . . distilled monoglycerides . . . more than 3400 Eastman Organic Chemicals for science and industry

Photos courtesy Bakelite Div.

Polyethylene bag strap fastens by slipping one end through slit in other end

Closure is a separate unit—facilitates frequent use without damaging container

Food Bag Strap

OPENING and closing of a food bag made of Bakelite polyethylene is facilitated by a new closure strap produced of the same material. Both bag and strap are manufactured by Shore Line Industries, Inc., Clinton, Conn. The strap, a separate unit that is not sealed to the bag, is stamped from continuous extruded strip. It fastens by merely slipping one end through a slit in the opposite end, and permits the bag to be opened and closed many times without damaging the container.

Shore Line embosses its name on the strap during the stamping operation. Color is printed as a separate operation, however, since the strap is marketed in various colors.

The polyethylene bags permit the passage of certain gases, yet retain moisture, enabling food stored in them to remain crisp and fresh. Bags are sold in capacities ranging from 1 pint to 12 quarts. They are designed especially for use in freezers.

Ever since Farrel-Birmingham first developed the Banbury Mixer over thirty years ago, the design and construction of the machine has been continually improved and its operating efficiency steadily increased.

Improvements in operating techniques and in the design of the machine itself have resulted in greater uniformity and higher quality of mixes produced. Better production layouts have practically eliminated the manual handling of stock from the compound room and to succeeding machines.

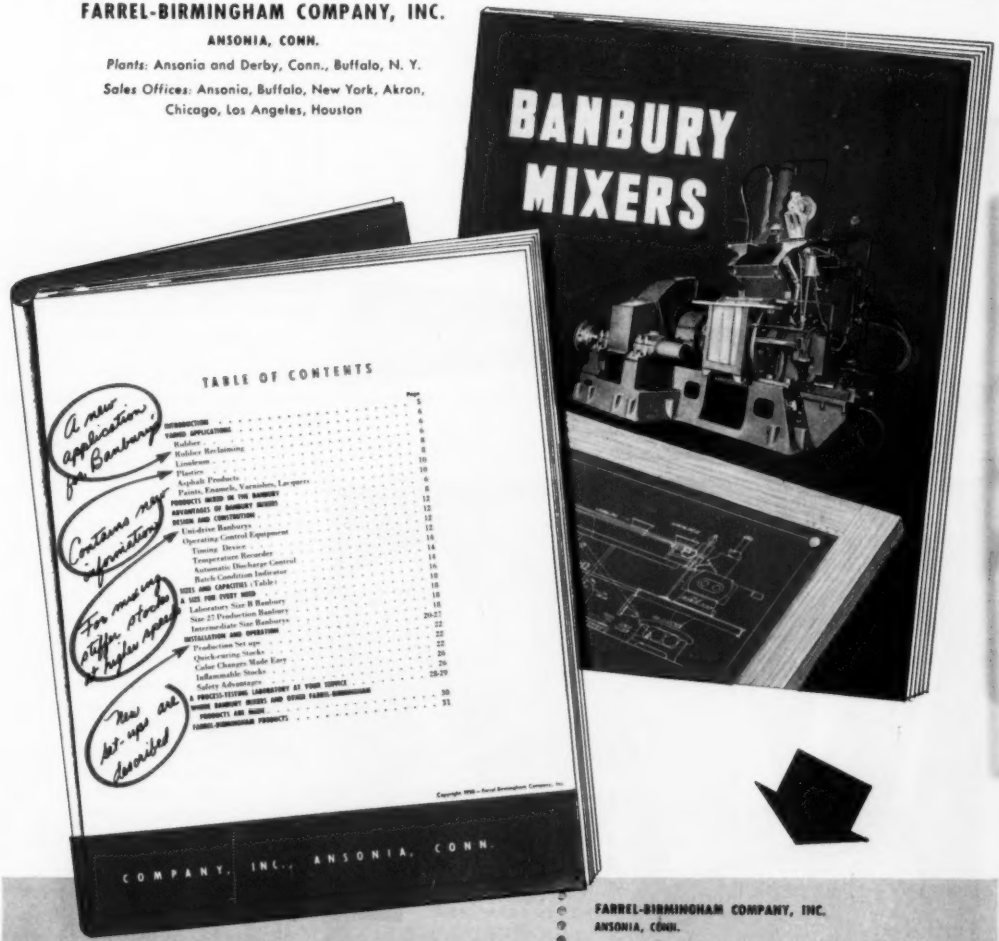
THERE IS ALWAYS SOMETHING NEW in Banbury Mixer Design

FARREL-BIRMINGHAM COMPANY, INC.

ANSONIA, CONN.

Plants: Ansonia and Derby, Conn., Buffalo, N. Y.

Sales Offices: Ansonia, Buffalo, New York, Akron, Chicago, Los Angeles, Houston



The complete story of the latest Banbury developments is contained in this new bulletin. For your free copy, just fill out the coupon and drop it in the mail today.

Farrel-Birmingham®

FARREL-BIRMINGHAM COMPANY, INC.
ANSONIA, CONN.

Please send me without cost or obligation, a copy of your new Bulletin 189, "BANBURY MIXERS."

Name_____ Title_____

Company_____

Address_____

City_____ State_____

FB-640

V-Ring Packing

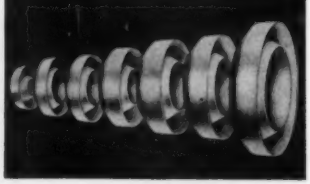
DESTRUCTIVE wear in hydraulic valves caused by packing—which, itself, is eventually eaten away by corrosive solutions—has long posed a costly problem to manufacturers. But with the introduction by Crane Packing Co., Chicago, Ill., of its Chemlon V-ring packing, molded of Teflon, significant economies have been made in many hydraulic applications.

This new product combines the chemically inert and frictionless properties of tetrafluoroethylene with the resilience and toughness needed for proper sealing at packing glands. A special cross-section design insures permanent sealing with no more than finger-tight pressure on the gland at temperatures up to 450° F. The resulting seal holds efficiently even under the stress of varying pressures.

The low friction characteristics and the ability of these Teflon V-rings to withstand high temperatures and corrosive chemicals increase the scope of hydraulic applications in the chemical field. Formerly, many of the newest hydraulic developments could not be designed into some chemical plant equipment because of the service limitations of available packings. Further, Chemlon packing has been found to stand up longer than conventional packing previously used.

Chemlon V-Rings are available from stock in many standard sizes; additional sizes can be specially molded to meet specific requirements. Other Teflon fabrications supplied by Crane include braided type packings, French and standard ring gaskets, extruded and machined forms, and a wide variety of molded shapes for applications in electrical insulation.

Long-life frictionless valve seal is provided by tetrafluoroethylene packing



Four internally molded bosses at base of container grip mixer studs tightly

Mixer Container

DESIGN flexibility and virtual elimination of breakage are among the plus values gained by the use of plastics for the container of the Dormeyer Blender, a new type appliance made by Dormeyer Corp., Chicago, Ill., to liquefy, shred, and chop various types of fruits and vegetables.

Blending takes place in a transparent 32-oz. container molded of Tenite I cellulose acetate by Industrial Plastics Co., Chicago, Ill., in a single-cavity die on a 16-oz. injection press. Industrial also molds a gray acetate cover in a two-cavity die on an 8-oz. press.

Features of the plastic container which would have presented production problems had glass been used include integrally molded internal vanes and ribs, contributing to a vortex mixing action, and four large cored bosses at the base. These bosses, which fit over rubber-padded studs, are held to close tolerances to provide a non-rocking fit while blender is in motion.

The container is molded with a center sprue at the bottom which is milled off by the molder to form an opening—reinforced by a boss and four ribs—through which the bearing and shaft assembly for the blender blades are mounted.

By using acetate instead of glass, it was possible to cast a container with thinner wall sections and weighing about one-third less—a factor influencing both shipping costs and ease of handling.

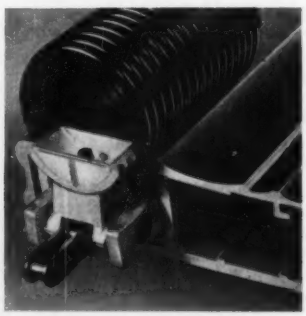
Bearing Shoes

NOISELESS wear-resistant bearing shoes for the hand rail of a moving stairway have been produced through the judicious use of fabric-base laminated phenolic. Synthane Corp., Oaks, Pa., supplies the plastic to Peelle Motorstair Div., The Peelle Co., Brooklyn, N.Y.

Original specifications called for laminated thermoset strips to act as a track for metal shoes which both guided and supported the hand rail. However, it was found that this installation presented the following problems: wear was not perpendicular to laminations, as the most advantageous design dictates; strips had to be bent to a 60-in. radius at top and bottom of the Motorstair; and these radii had to be connected to the plate surface by a smooth joint to minimize noise and wear as the metal shoes passed over them.

To overcome these obstacles, the whole design was reversed: Synthane laminate shoes were made to slide on a metal track so that wear is perpendicular to laminations. The shoes were 1¾ in. long and 5/16 in. thick, made of Grade C Synthane, with the upper and lower surfaces made slightly concave by shaving so that each block rides on a reduced area at the ends. Each shoe is drilled and counter-bored to accept two guide pins, to assure alinement, and a large Phillips screw which secures the shoe to an aluminum base block. Thus the short length of the shoes, coupled with a spirally wound, aluminum hand rail, give a flexibility which permits the unit to follow the radii easily.

Pair of laminated phenolic shoes which support moving rail are at lower left



Specially Designed for Plastic Finishing

Designed particularly for wet sanding of plastics and other ductile materials subject to plastic flow, Waterproof Cloth Belts by CARBORUNDUM operate with efficiency, economy and safety in plastic finishing. Constant cutting rate maintained throughout belt life; "down-time" for tensioning adjustments reduced by retarding of wet-stretch; safe operating conditions provided through elimination of splice-throb which often leads to belt breakage. See your CARBORUNDUM representative for full details.

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CARBORUNDUM
TRADE MARK

Making ALL abrasive products . . . to give you the proper ONE

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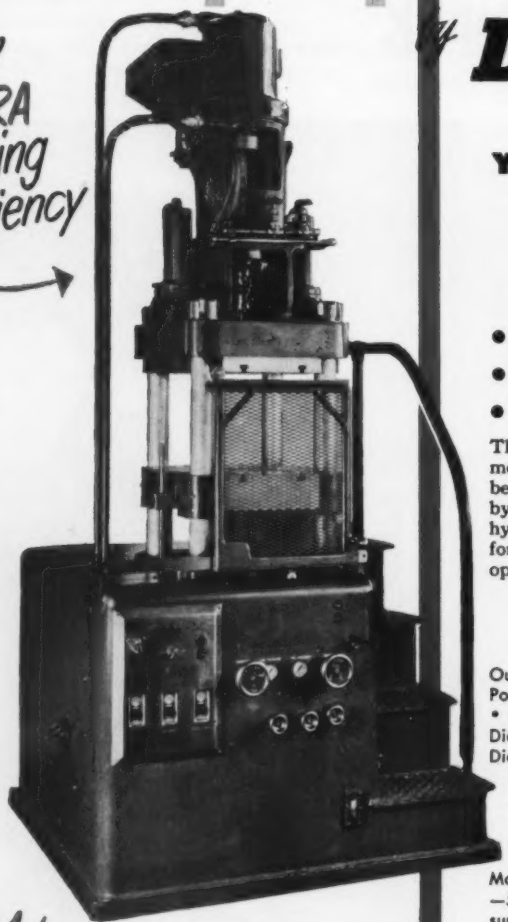
multi-purpose press

for EXTRA molding efficiency

by DE MATTIA



You can use this press

3 WAYS!

- *FOR INJECTION*
- *FOR COMPRESSION*
- *FOR TRANSFER MOLDING*

This highly efficient vertical injection molding press is designed so that it can be used for compression and transfer work by making a few low cost additions. All hydraulic, it features smooth fluid power for both injection and mold clamping operations.

DE MATTIA VERTICAL MODEL G1

SPECIFICATIONS

Ounces Molded per Shot — 4 (Styrene) • Pounds of Plasticized Material per Hr. — 50 • Capacity of Feed Hopper (Lbs.) — 50 • Diameter of Injection Plunger — 1⅞" • Diameter of Hydraulic Injection Cylinder — 8½" • Pressure on Material—20,500 lbs. per sq. in. • Size of Die Plates—14" x 23" • Mold Opens — Stroke—15" • Max. Daylight—19" • Min. Die Space—4" • Motor—20 HP @ 1,200 RPM • Pump Capacity —54 GPM @ 1,000 PSI • Mold Closing Pressure (Tons) — 150 • Floor Space Required — 47" x 59" • Height Over All — 108" • Approximate Wt. of Machine (Tons) — 4¼" • Injection Piston Stroke — 7¼" • Closing Cylinder Bore—8 1/16" • Complete Injection Time (Max.) — 1.88 Sec. • Heating Cylinder — 4,350 Watts.

Ask **FOR YOUR COPY OF THE NEW CATALOG NOW**

The new De Mattia Catalog contains complete data on both Vertical and Horizontal De Mattia Presses. Also included is full information and specifications on compact, high capacity De Mattia Granulators and Scrap Grinders.

DE MATTIA MACHINE and TOOL CO.

NEW YORK SALES OFFICE 50 CHURCH ST. — CABLE ADDRESS: BROMACH, N. Y.
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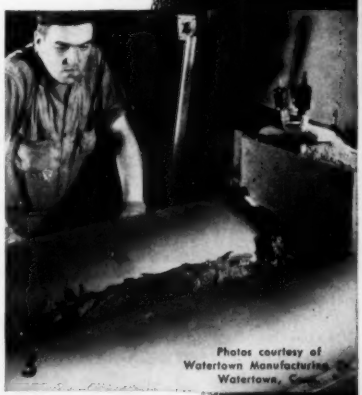
Proof that METASAP STEARATES MEAN BETTER MOLDING

Here's proof, in 3 pictures, that Metasap Stearates can help you do an excellent molding job:

Picture 1 shows a preform such as no molder wants. It was obtained during extensive tests run by the Watertown Manufacturing Company, and proved typical of a large number of preforms molded from compounds that did NOT contain Metasap Stearate as lubricant. Such preforms required an average pressure of 50 lbs. to eject them from the mold, and an unprofitably large percentage were delaminated in the ejection process.

Picture 2 shows a typical preform obtained, during the same tests, from molding compounds containing Metasap Calcium Stearate. Perfect in shape, such preforms required only 10 lbs. of pressure to release them from the mold.

Picture 3 shows how early in the manufacturing cycle the advantages of Metasap Stearates can be realized. In rolling sheets of molding compound (prior to grinding for powder) the inclusion of a Metasap Stearate aids in preventing the material sticking to the rolling mill.



Photos courtesy of Watertown Manufacturing Co., Watertown, Conn.

ADD IT ALL UP—and the answer is plain:

Lubricating with Metasap Stearates assures—

Improved Preforms—without delamination . . . since high ejection pressures are unnecessary.

Improved Finished Products—clean cut, with more marketable finish.

Increased Output—Rapid, easy ejection avoids waste of time and effort—assures fewer rejects.

Increased Economy—Preform molding can be done with machines of less tonnage. Molding materials are conserved. Mold life is increased—because scoring is virtually eliminated.

Metasap Zinc and Calcium Stearates, for use in molding plastics, assure significant manufacturing economies all along the line—and better products, too. Today, when you must produce *quality* and sell *competitively* you'll find Metasap stearate lubrication an indispensable aid to more profitable operation.

For complete information, write

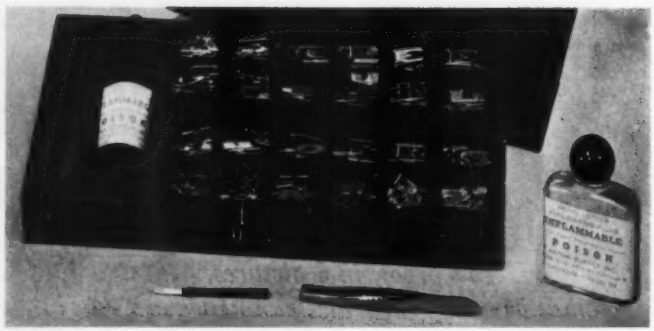
METASAP CHEMICAL COMPANY, HARRISON, N. J.

Chicago • Boston • Richmond, Calif. • Cedartown, Ga.

METASAP CHEMICAL COMPANY REG. U.S. PAT. OFF.

Stearates

of Calcium • Aluminum • Lead • Magnesium • Zinc



Initial letters, designed especially for personalizing plastics products, are coated on reverse side with special adhesive which is reactivated by dipping in a solvent

Initial Letters for Plastics Products

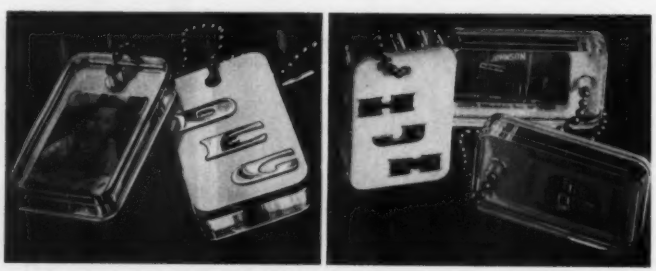
INCREASED value is given to articles manufactured of certain plastics when they are personalized by initial letters, applied to order. Such initials, provided with a special adhesive, have been developed by Aetna Supply, Inc., Arlington Heights, Ill. Adaptable particularly to products made of acrylic or phenolic, the letters are easily put in place and can be applied by anyone in a matter of minutes.

The letters are made in approximately ¼- or ½-in. sizes in either chrome- or gold-plated zinc. The reverse side of the initials is coated with a special adhesive which is reactivated by dipping in a solvent for about 20 seconds. Permanent attachment is obtained simply by setting the initial in place.

Stationers, luggage manufacturers, and producers of advertising, novelty, and premium pieces, have put the initials to good use. One example of their utility is found in a key retainer, called Keefob, also supplied by Aetna. The key holder is molded of acrylic resin in two parts. An advertiser's message, trade-mark, or picture of a product is placed between the two parts which are then fused together. Ideal as a give-away, the item can be personalized in less than 1 min. by the application of initials, using a jig to locate the letters accurately. By adding this individual touch, the promotion piece is more likely to be kept longer by the recipient.

Another similar product, called Keeloket, substitutes a snapshot or photo for the advertising message. It is sold through photo finishers and drug outlets, which are provided with counter displays. The customer supplies the dealer with his favorite snapshot and designates the desired initials. Orders are then picked up, the product is fabricated, and the finished item is returned to the dealer.

Left: Acrylic key holder, bearing initials, is molded in two parts which enclose photo. Right: Similar product is used as promotion premium with advertising message inserted



IN DEMAND ALL OVER THE WORLD

WINDSOR'S

Machines for the Plastic Industry

INJECTION MOULDING

Windsor's injection moulding machines are of robust construction and are manufactured from the highest quality materials, specially designed to withstand the heavy loads to which the machines are subjected during operation. They are available in capacities ranging from .35 oz. to 80 oz. The 48 oz., 60 oz., and 80 oz. capacity machines are built under the Jackson & Church "Hendry" Pre-Plasticizing process.

EXTRUSION MOULDING

Throughout the world, extrusion moulders are using Windsor's extrusion machines, including the 3½" Single Screw Extruder (available in Europe only) and the Multi-Screw Extrusion Machine built under the "L.M.P." principles in R.C. 65-lb., R. C. 100-lb., and R.C. 200-lb. capacities respectively. The Multi-Screw Extrusion Machines are known for efficient compounding, mixing, and uniform extruding qualities.

PLASTIC MACHINES

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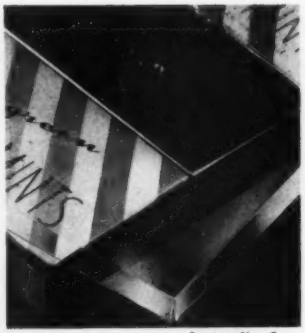


Courtesy Plax Corp.

Oriented styrene sheet can be creased to form set-up box without adhesive

Styrene Set-Up Boxes

EXCELLENT strength and crease-holding characteristics of Polyflex, an oriented styrene semi-rigid sheet produced by Plax Corp., Hartford, Conn., have made it possible for Paris Paper Box Co., Boston, Mass., to manufacture a low-cost transparent set-up box without the use of adhesives or heat-sealing techniques. The boxes are formed without cement by creasing channels at the corners into which die-cut tabs are inserted.

Since Polyflex is reported to be stronger than other materials used to fabricate similar containers, Paris is using light gages of the plastic with consequent low material costs. It has also been found that the strength of Polyflex makes the material easy to handle on production lines.

In addition to offering these advantages, Polyflex has been found by Paris to lend itself to uniform fabrication, resulting in accurately fitting top and bottom pieces. Boxes fabricated of this material are also reported to have high resistance to cracking in cold and damp weather and good optical clarity.

Another Paris use of Polyflex is as a flap for the top of display boxes from which units are to be removed one at a time, as sold. The merit of Plax sheet in this application is that it always lies flat and does not curl at the edges, thus retaining a trim, neat appearance.

THE MOST ECONOMICAL MODERN AUTO-CONTROLLED MOLDING PRESS

BIPEL

Compression/Transfer Models Covering 20-300 Ton Range

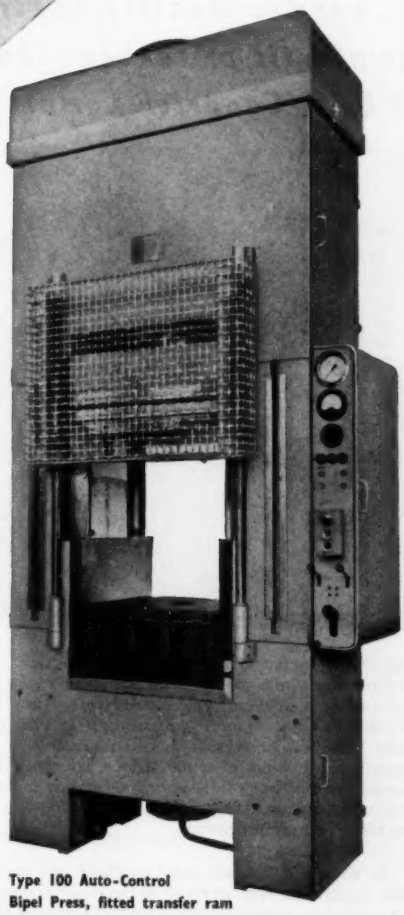
Designed originally for the molding division of the B.I.P. Group, originators of aminoplastic molding powders in Great Britain, these presses can be supplied either with individual drive contained within the press frame or preferably to operate in groups of up to 12 from a special 1000-p.s.i. pumping unit. Choice of operating pressures at each press: 1000, 2000 or 3000-p.s.i. from a novel built-in intensifier.

Completely flexible cycle controller eliminates the human factor, gives any conceivable molding routine and ensures constant product quality.

Tested for the last three years on a 24 hours a day schedule, these presses have shown a great reduction in rejects and operating costs.

There are three models:—

Type 40: Pressure range 20 - 60 tons
Type 100: Pressure range 50 - 150 tons
Type 200: Pressure range 100 - 300 tons



Type 100 Auto-Control Bipel Press, fitted transfer ram

BRIEF SPECIFICATIONS

FRAMES: Heavy steel plate, electrically welded, stress relieved, enclosing completely all hydraulic and electrical equipment. Water-cooled platens.

RAMS: Annulus type, hard chromed, fitted with C.I. piston rings.

HYDRAULIC SYSTEM: 1000-p.s.i. ring main supplied from self-contained unit embodying air-loaded accumulator and special B.I.P. unloading valve *which cannot by-pass fluid under pressure but always unloads.* Working pressures of 2000 to 3000-p.s.i. are obtained by intensifier built into press.

AUTOMATIC CONTROL: Pneumatically operated. Can reproduce with precision any molding cycle that can be performed manually.

ELECTRICAL GEAR: All built-in including thermostatic control for platens and molds.

GUARDS AND CHOCKS: Interlocked and automatically operated from sequence controller.

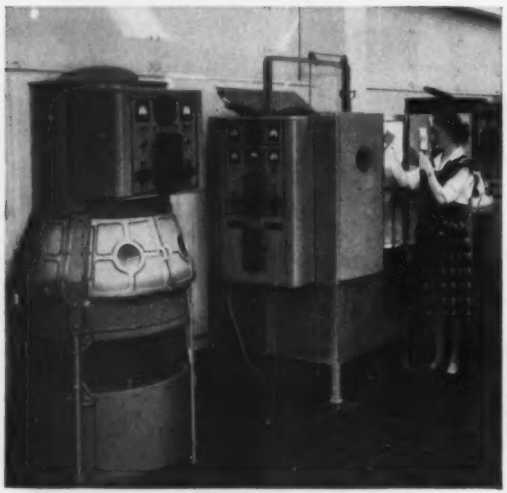
NOT JUST A PRESS, BUT ENGINEERED IN EVERY DETAIL AS A PRECISION MACHINE TOOL

B·I·P GROUP

B.I.P. ENGINEERING LTD., ALDRIDGE ROAD, STREETLY, STAFFS, ENGLAND

ATLAS-OMETERS

. . . used in Quality Control for plastic or rubber products at B. F. Goodrich Company



An important part of the tests at B. F. Goodrich Company Laboratories involves subjecting products to the destructive effects of weathering conditions they will be expected to meet in service. By using Atlas Fade-Ometers and Weather-Ometers it is often possible to obtain quickly, in advance of actual service, assurance that new materials will have satisfactory resistance to cracking, sun-checking, chalking, fading or bleeding of color, or to loss of elastic properties.

In the Fade-Ometer—used to check the reaction of any material or type of finish to the deteriorating effects of sunlight—plastic materials such as Koroseal are tested for permanence of bright color. The Weather-Ometer—which accurately duplicates rain, heavy dew, sunlight and thermal shock—offers complete control of these elements so that any desired climatic cycle can be obtained. Results of tests in the Weather-Ometer are used in the evaluation of the aging and weathering characteristics of rubbers and plastics under accelerated conditions corresponding to outdoor exposure.

The machines are easy to operate, fully automatic, and may safely be left in continuous operation overnight without attention from the operator.

ATLAS ELECTRIC DEVICES CO.
361 West Superior St., Chicago 10, Illinois
WEATHER-OMETERS • FADE-OMETERS • LAUNDER-OMETERS

NO MEASURING!
NO INVENTORY!
NO MESS!

Mix the contents of a sealed, pre-weighed package of JAMISON DRY COLOR MIX with 100 lbs. of crystal polystyrene. In 10 to 20 minutes you have standard colors . . . ready to mold!

JAMISON DRY COLOR MIXES give you:

- Consistent results . . . all ingredients carefully *pre-blended* . . . tested in over 6 years of molding-plant use.
- All standard colors . . .
- Special colors supplied on quantity orders.
- Sharply-cut labor costs . . . you can use most standard mixing equipment.

Send today *for the full story of JAMISON DRY COLORS*

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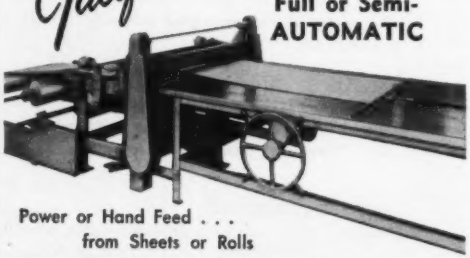
Versatile Production Cutting

THE *Jacques* **POWER SHEAR**

Full or Semi-AUTOMATIC



Power or Hand Feed . . . from Sheets or Rolls

Faster intermittent or continuous cuts . . . up to 70 fifty-inch cuts per minute

Free — Illustrated booklet on "Versatile Production Cutting." Write for your copy today.

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EST. 1882
25 Salisbury St., Worcester 5, Mass.

For slitting and rewinding investigate the new Jacques Slitter and Rewinder. Faster — Lighter — Handles more materials.

Courtesy United States Rubber Co.

Plastic-rubber pail for handling corrosive chemicals has high impact strength

Copolymer Pail

ADVANTAGES of Enrup—the tough thermosetting blend of plastic and rubber produced by United States Rubber Co.—are put to good use in an unbreakable bucket for carrying corrosive chemicals which has been announced by the firm's Mechanical Goods Div., Passaic, N.J. The chemical and heat resistance of Enrup make it possible for the pail to resist aliphatic solvents, all concentrations and types of alkalis, many acids, and other corrosives at temperatures up to 150° F.

Because of the high-impact strength of the material, heavy construction is not necessary; thus, the 12-qt. pail weighs only 3 pounds. Despite this light weight, the bucket is highly durable, abrasion resistant, and will not shatter or crack even under severe abuse. The compression-molded product is semi-flexible, yet rigid enough to serve the purpose for which it was designed.

A capacity scale, graduated in quarts, is molded on the inside surface of every bucket. Handles, also molded of the same material, are designed to permit ease of carrying and pouring even when the container is fully loaded.

Although not intended for carrying formic, glacial acetic, concentrated nitric and sulfuric acids, aromatic solvents, esters, or ketones, the bucket can handle nitric and sulfuric acids satisfactorily in concentrations up to 50 percent

Filters

(*Continued from pp.* 102-4)

additional 0.3%, could be removed completely.

Factors in Use

Although the filter disks have been prepared over a very wide range of porosities, it should be pointed out that only the flame-sprayed material itself can be fairly readily duplicated. With any additional treatment, particularly buffing, it is difficult to control porosities so that they even approach the degree of precision achieved in the preparation of commercial glass filter disks. The powder particles are not uniform in size or shape, and, as is true with all plastic materials, they are very likely to be broken down into smaller particles or to be smeared into an impervious film by heavy abrasive action. However, as smaller pores are required for most applications, the method of controlling porosities through trial and error by means of cold-pressing offers a simple but effective means of achieving the desired result.

It has been indicated that a certain amount of the inertness of Fluorothene to organic solvents is destroyed by flame-spraying. In cases where this is important, the small percentage of low molecular weight polymer involved can be removed by solvents prior to use.

Because of the present high cost of Fluorothene and the large amount of labor involved in preparing filtration disks, it is not anticipated that this material will replace any of the filtration mediums in present use. However, in those cases where the filtration of highly corrosive or radioactive materials is still a serious problem, it is apparent that cost becomes a negligible factor and that the use of fritted Fluorothene will be more than justified.

Acknowledgment

This document is based on work performed for the Atomic Energy Commission by Carbide and Carbon Chemicals Div., Union Carbide and Carbon Corp., and was presented before the Paint, Varnish, and Plastics Chemistry Div. at the 116th meeting of the American Chemical Society, Atlantic City, N. J.—END

S.P.I. Conference

(*Continued from p. 61*)

those of last year, probably because of difficulties encountered by consumers when attempting to cut and sew vinyl film. Macy's has discontinued the sale of unsupported vinyl upholstery fabrics because of customer complaints resulting from customer inexperience in handling the product.

Many other specific applications were discussed, as was the problem of informative labelling.

Static Elimination

A solution to the problem caused by static electricity when printing vinyl film was put forth by Rolland L. Jenkins of Canadian Radium Uranium Corp., in a paper entitled "Radioactive Static Eliminators for Improving Quality of Printed Vinyl Films and Eliminating Fire Hazards."

The solution put forth was the installation of radioactive static eliminator bars placed across the film and within 1 in. of it. The radioactive source is polonium, a pure alpha ray emitter, with no harmful beta or gamma radiation present. The case Mr. Jenkins used as an illustration was that of vinyl film being printed on a four-color gravure press. The method, he pointed out, can be modified for use in other film operations such as coating, calendering, and embossing.

Temperature Control

George S. Laaff, of The Bolta Co., presided at the morning session on the second day of the conference. The first paper, "Accurate Temperature Control and Variation of Temperature for Calenders and Presses," was delivered by Paul L. Geiringer chief engineer of American Hydrotherm Corp.

Mr. Geiringer analyzed many aspects of the problem of maintaining accurate control of temperatures. He discussed the choice of proper heating medium, cylinder design, and circulating system. The paper was illustrated with slides of charts, diagrams, and photographs.

Fabrics for Furniture

Walter S. Marder, vice president of Daystrom Corp., delivered an address on "Vinyl Fabrics for Furniture — Today and Tomorrow." Mr. Marder spoke of the need for standards in vinyl upholstery materials. He spoke specifically of the problems of embrittlement, staining of vinyl when it comes into contact with rubber springing, color fastness, and color uniformity.

Mr. Marder also discussed design problems which have to be solved if the industry is to keep up with consumer demands. He spoke of the need for more stylish colors, better patterns, and improved surface texture.

Merchandising Furniture

"Merchandising of Vinyl Upholstered Furniture at the Retail Level" was the topic of the paper delivered by R. S. Schwartz of Furniture Div., Spiegel, Inc. Mr. Schwartz pointed out that vinyls were in a position to take over a large share of the market for upholstery fabrics. But he made the point that the vinyls still have a big selling job to do on the consumer.

Mr. Schwartz contended that manufacturers of vinyl materials must maintain quality standards,

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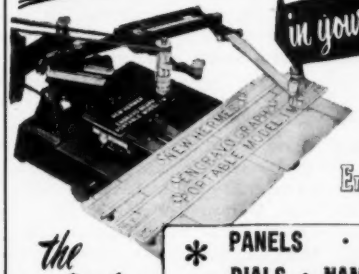

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improve their product, and use restraint in their selling methods. He advised an abandonment of the attempts to make vinyls look like other materials and the use of greater ingenuity to create new and dramatic patterns not drawn from other fabrics.

Military Applications

Fred S. Strauss of Harte & Co., Inc., presided at the final session, the luncheon session on Friday, Dec. 15. The first speaker was Warren Stubblebine, research director, Military Planning Div., Office of the Quartermaster General. His topic was "Material Needs of the Armed Services."

Mr. Stubblebine discussed the military packaging applications for film. He pointed out that such applications for polyethylene probably would not carry sufficiently high priorities to get the material under a total allocation system. Thus the military services are looking for other materials to do the job.

Mr. Stubblebine also emphasized the essential uses of vinyl film are few but that the Army is interested in vinyl film for such applications as rifle and gun covers, personal effects bags, and liners. It is also considering the use of vinyl film raincoats and other water-proof clothing but, so far, the materials are unsuitable because of insufficient snag and tear resistance, low seam strength, and psychological objections.

Mr. Stubblebine also spoke of the possible use of vinyl films and vinyl-coated paper for food packaging. He mentioned that one vinyl material has been approved by the Food and Drug Administration for such applications.

In contrast to the use of film, Mr. Stubblebine observed, there are many military applications for vinyl-coated fabrics. He mentioned such uses as the coated nylon poncho and vinyl-coated glass fabric for Arctic shelters. No change is contemplated in such items, and there is a possibility that vinyl-coated fabrics may be adopted for some items now made of rubber coated fabric.

Stabilizers

R. E. Lally, technical coordinator of Ferro Chemical Corp., spoke on "Recent Developments in Stabilizers." His talk dealt mainly with those developments which may ease the problem of stabilizer procurement. The answer to the problem of obtaining stabilization should cadmium become unobtainable, according to Mr. Lally, lies in the use of zinc.

Mr. Lally discussed the theory of degradation and stabilization, the ways in which film may degradate, and the various types of compounds used as stabilizers.

He reported that it is now practical to use zinc in vinyl compositions and pointed out the following advanatges: zinc compounds are low in cost; zinc is required only in small quantities; zinc compounds are generally non-toxic; and zinc compounds for stabilization purposes should remain plentiful even in times of critical shortages.

Supply Situation

The meeting concluded with a panel discussion on the supply situation in stabilizers, pigments, resins, mechanical equipment, and plasticizers. This discussion is covered in the special news section facing page 54.—END

The needs of national defense, added to the extra requirements stemming from the rapidly-growing popularity of plastics products, have created demands in excess of Monsanto's capacity to produce Santicizers and other quality plasticizers.

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S. P. E. Meeting

(*Continued from p. 67*)

Recommendations were made concerning the proper selection of the three general types of electroformed masks. Suggestions were given as to holding and pressure fixtures; design of the part and mold so as to reduce costs in the painting of the part; and machinery available and machinery prospects in development for automatic spray painting of plastic parts with metal masks.

Plastics Industry in Great Britain

H. V. Potter, Bakelite, Ltd., London, England

An outline was given of the general organization of the plastics industry in Great Britain, including the functions of some of the trade and scientific groups. The relationships of these groups to the development and working of the British plastics industry were discussed in some detail.

The paper also included a discussion of the raw materials position, the expansion of the British plastics industry during the recent years, probable future trends of the industry, the functions of some other groups connected with the plastics industry and some statistics on the industry in Great Britain.

A Family of High Speed Thermoset Plastic Molding Materials

Michael J. Brown, Jr., Plaskon Div., Libbey-Owens-Ford Glass Co., Toledo, Ohio

New growth in thermosets depends on the development and acceptance of new materials, new equipment, and a basically new approach to the techniques of fabricating thermoset materials. The problems faced today by the thermoset plastics which must be solved in order to assure continued growth are: 1) develop materials and methods that will enable compression molding to compete economically with injection and extrusion molding; 2) develop methods of fabricating economically very large parts with high strengths without exorbitant increases in the size and massiveness of molding or fabrication equipment; and 3) develop materials which will present physical properties to enable plastics to serve where no plastics are now acceptable.

A start has been made toward the solution of these problems. Molding materials with fabricating characteristics quite different from those applied to standard thermoset materials are now available and are in commercial use. Work is progressing on adding to the family of materials based on polyester resins which have molding characteristics permitting an attack on the basic problems outlined above.

After-Treatment of Molded Polystyrene Parts

Charles J. Snyder, Koppers Co., Inc., Pittsburgh, Pa.

In order to cover all phases of the topic it would be necessary to discuss annealing, destaticizing, painting, coating, machining, and fabricating operations. However, in order to narrow the scope of the subject, the phase concerning all the ramifications of annealing was chosen. This choice was made because high labor costs, materials

shortages, and keen competition in the plastics industry make the annealing method of saving parts very attractive.

Various mechanical means of relieving strains in styrene are possible, and are determined by the economies to be effected. A detailed consideration of the advantages and shortcomings is necessary to round out the picture. In addition, it is important to have a simplified control testing procedure available to demonstrate the effectiveness of the operation.

A review of the entire picture, including the advantages in the form of savings and the possible limitations, provides justification for annealing molded polystyrene parts.

Polyesters

Earle S. Ebers, Naugatuck Chemical Div., United States Rubber Co., Naugatuck, Conn.

Polyesters are an outgrowth of the alkyd resins which are so widely used in finishes and protective coatings. These resins consist of an unsaturated alkyd in combination with an unsaturated monomer. This paper reviewed the war-time contributions of the polyesters, their outstanding properties and methods of utilization in current products, and sought to forecast developments.

Distribution and Production Picture on Large Injection and Compression Moldings

Edmond D. Kennedy, Edwin L. Hobson, Frank J. Donohue, and Sanford E. Glick, all of Monsanto Chemical Co., Springfield, Mass.

In this symposium, Mr. Kennedy directed the course of the discussion. Mr. Hobson discussed present marketing of large moldings, such as in refrigeration, television, radio, luggage, and display signs. He also discussed future developments in other fields, including furniture, air conditioning units, plumbing, architecture, etc. Mr. Donohue spoke on design factors with large thermosetting moldings, as well as material properties.

Mr. Glick noted that although styrene was first used in the novelty field because of its low cost, it has gained increasing importance in industrial applications. Properties of styrene which stimulate this industrial trend include excellent dimensional stability, low moisture absorption, low specific gravity, uniform physical properties, non-retention of odor, resistance to attack by a wide range of chemicals and foodstuffs, and ease of molding.

Injection Molding Machines of the Future

Moderator—Islyn Thomas, Thomas Mfg., Co., Newark, N. J. Panel members: J. F. Hronek, Fellows Gear Shaper Co., Springfield, Vt.; David J. Sloane, Lester Engineering Co., Cleveland, Ohio; Albert Spaak, De-Matia Machine & Tool Co., Clifton, N. J.; George W. Whitehead, Improved Paper Machinery Corp., Nashua, N. H.; and James S. Wilson, Watson-Stillman Co., Roselle, N. J.

In a panel discussion under the above title, Mr. Thomas gave a brief review of the history of injection molding machines. The panel discussion revolved around such important phases of injection machine development as the design of heating cylinders, standardization of ma-

(*Continued on p. 173*)

How to extend supplies of scarce phenolics up to 30%

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chine components, the relative value of toggle and hydraulic clamps, the advantages to be obtained from preplasticizing, and the growth in size of machines.

Materials Supply Prospects in 1951

Frank H. Carman, Manufacturing Chemists' Assoc., Inc., Washington, D. C.

It was emphasized that the basic chemicals are becoming an ever more important and controlling factor in our materials supply. Although production of plastics is running at extremely high levels, and capacity has been expanded greatly since World War II, the industry is still short for many important uses. Probable effects of mobilization were forecast insofar as possible.

Conditioning Phenolic Materials for Stability in Molding

Jerome L. Formo, Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.

The effect of varied conditions in the steam preheating process has been studied with regard to volatiles produced during the preheating and molding operations, the mechanical and electrical properties of as-molded test pieces, and the long-time aging characteristics of molded phenolics.

Relationships are shown between moisture conditions in the preheating chamber and quantities of volatiles produced under a variety of conditions. Similarly, relationships are shown to exist between moisture conditions and various physical properties, including tensile strength, flexural strength, impact strength, shrinkage and electrical properties.

The effect of long-time aging under various conditions indicates that exposure conditions after molding are of much greater consequence than conditions existing during the molding operation.

Molding and Extrusion of Teflon

D. D. James, E. I. du Pont de Nemours & Co., Inc., Arlington, N. J.

Teflon is one of the most unusual plastics developed in recent years. Its chemical and physical properties have created wide interest in this outstanding new engineering material.

Industrial uses of Teflon are based on its temperature resistance, chemical inertness, electrical properties, and non-adhesive characteristics.

The fabrication of Teflon is related to powdered metal techniques. In molding, the polymer is preformed, baked, and then cooled under pressure. When maintenance of close dimensional tolerances on a molded part is necessary, the baked piece is coined while still hot.

Teflon can be extruded by means of a screw or ram extruder into rods and tubes of various sizes. In extrusion, unlike other plastics, the screw or ram compacts under no heat into long-land dies where sintering is accomplished.

The method used for coating electrical conductors depends on the required wall thickness of the Teflon. Thick walls are produced by screw extrusion of granular polymer. Intermediate wall thicknesses are made by ram extrusion of a lubricated dispersion of the polymer. Very thin walls can be coated on wire by dipping the wire into a Teflon Suspensoid.—END

THE PLASTISCOPE*

NEWS AND INTERPRETATIONS OF THE NEWS

By R. L. Van Boskirk

Alkyd Resin Polyesters

SOLID alkyd resins for use particularly in reinforced plastic molding are now on the market under the trade-name of Atlac. The new resins are being produced by Atlas Powder Co., Wilmington, Del.

One of the outstanding features of these resins is that they contain no styrene or other so-called solvent, and have an indefinite shelf life. The processor mixes styrene or other co-reactive solvents with the alkyd when he is ready to use it.

There are two types of these resins: 1) a solid powder precatalyzed with benzoyl peroxide to be used as binders for thermosetting powder applications; 2) a solid powder 100% alkyd resin for use with copolymerizable monomers such as styrene, allyl compounds, vinyl acetate, methacrylates, and other monomeric materials in the preparation of laminating or coating resins or molding powder compounds.

These resins may be used with reinforcements such as asbestos, paper, woven and nonwoven fabrics, and glass fibers. As binder resins, they do not darken the base material. They also help to improve the resin impregnation of the mat, which results in better molding characteristics when the material is molded. These dry binder resins are currently being used in the production of glass mat and are said to make possible production of a thick mat weighing from 1 to 5 oz. per square foot.

The Atlac resins used for molding purposes are claimed to have unusual compatibility with styrene or other reactive solvents; current recommendation is for 35% styrene and 65% alkyd in the final molding material. There is no after-odor and no taste to the finished moldings, which help to make them especially applicable for food and clothing containers. It is also claimed that they give an improved surface finish so that enamels can be more easily and more uniformly applied to the finished moldings, and in some cases it may not even be necessary to coat the product.

Company officials claim that when Atlac is used, there will be less shrinkage in the final molding than is generally customary with polyester resins. The new type resins are also designed to coat the glass or other fiber more thoroughly and give a wet strength retention of between 90 and 100 percent. They also have a high heat distortion point of over 400° F. Electrical properties are good because of a high carbon-to-oxygen ratio in the alkyd. Dimensional stability of high degree is assured since these resins are declared to be less susceptible to water and, therefore, the finished molding will absorb a smaller quantity of water.

Another interesting possibility for these resins is that they help to increase the ratio of glass that may be used in preformed pieces. Present preforms use about 35% glass, but it is believed that Atlac resins will permit a considerably higher percentage and thus help to lower the cost of finished molded pieces.

Corporation Absorbs Subsidiary

THE business and activities in Tennessee and Texas of Tennessee Eastman Corp., a wholly-owned subsidiary of Eastman Kodak Co., will henceforth be conducted as divisions of the parent company, according to Thomas J. Hargrave, president of Kodak, and James C. White, president, Tennessee Eastman Corp. The Tennessee organization will be known as Tennessee Eastman Co., Div. of Eastman Kodak Co., while the Texas branch will be known as Texas Eastman Co., Div. of Eastman Kodak Co.

These divisions will continue the same activities at Kingsport, Tenn., and Longview, Texas, respectively, with no change in personnel or policies. A. M. Tenney Associates, Inc., will continue as sales representative for Eastman fibers.

Tennessee Eastman Corp. was organized in 1920 as a manufacturing unit for methanol, an essential ingredient of photographic film base. Late in the 1920's Tennessee Eastman Corp. began the manufacture of cellulose acetate, a basic raw material in safety, x-ray, and home movie film. Acetate yarn and acetate plastics were developed in the 1930's.

The original Tennessee Eastman wood distillation plant had eleven buildings. Today the corporation's plant has more than 150 buildings on about 370 acres at Kingsport, Tenn.

The Longview, Texas, facilities are still in the construction stage. They are expected to start production in the last quarter of 1951.

Research Society Show

GEARING for preparedness to meet the demands of the "feuding fifties" is the general theme of the 1951 Annual Meeting and International Industry Show of the Forest Products Research Society to be held the week of May 7 at Convention Hall in Philadelphia. W. Burdette Wilkins, a Professional Member of The Society of the Plastics Industry, is general chairman of this convention, the first major meeting ever held in this country for inter-society participation of the leading technical societies. S.P.I. will conduct a complete technical session at the meeting, which will include

Last-Minute News

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Watch for this feature in each issue. Use its content to keep informed of the latest news and developments in the rapidly changing mobilization picture as they affect the Plastics Industry—and as they affect you.

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From East Texas to South Ohio

A current example of Stone & Webster Engineering Corporation's broad experience in design and construction for the natural gas industry is the six compressor stations on Texas Gas Transmission Corporation's recently completed 800-mile, high-pressure line.

The six stations along the line between Carthage Gas Field in East Texas and Middletown, Ohio, include gas engine driven compressors totalling 42,500 hp for boosting the gas pressure from 575 to 800 pounds for transmission.

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PLASTISCOPE

technical papers devoted to subjects of mutual interest to both plastics and forest products industries. Equipment, machinery, and associated products exhibits from all over the world will be shown.

Another Injection Machine

AN injection molding machine of 16- to 20-oz. capacity, built by B & T Engineering and Sales Co., 2268 Penobscot Building, Detroit 26, Mich., will be ready for inspection by prospective purchasers in April of this year. The toggle designs are similar to the toggles used in the company's die-casting machines; four toggles are used, locking directly under the tie bars, assuring equalized locking pressure on all die surfaces.

The die opening will have a minimum of 6 in. and a maximum of 24 in., with an extra fast operating speed. The plasticizing unit will be adequate.

Buys Buna-N Plant

THE Buna-N synthetic rubber plant of Esso Standard Oil Co., Baton Rouge, La., has been purchased by United States Rubber Co., as a major step in the expansion of its facilities for the increasing manufacture of chemicals, plastics, and synthetic rubbers. The plant will be operated by the Naugatuck Chemical Div. of United States Rubber Co., which will continue to market Buna-N rubber (acrylonitrile-butadiene) under the trade name Paracril. This is the Buna-N type rubber that was once known as Perbunan.

According to John P. Coe, manager of the Naugatuck Chemical Div., the plant was purchased first because it provides the means for manufacturing a healthy, growing product in Buna-N synthetic rubber; second, it increases the company's facilities to produce high styrene copolymer latex for water paints and as a partial replacement for casein in the paper industry; third, it provides additional production facilities to meet the sharply increasing demand by the plastics industry for the company's new plastic-rubber blends.

United States Rubber Co. was among the first to introduce acrylonitrile as an important component of thermoplastic molding materials and sheet stock. The company's plastic materials, such as Royalite, Uscolite, Enrup (a thermosetting phenolic-Buna-N type), and Kralastic, all contain some amount of acrylonitrile or Buna-N; these various combinations are discussed in a Plastiscope article of June, 1948, describing United States Rubber Co. patents on these materials. Facilities for making Kralastic in particular are exceedingly limited, and it is believed that a good portion of the new plant will be devoted to the manufacture of this tough, high-impact styrene copolymer thermoplastic molding material which is now in heavy demand.

The Baton Rouge plant has capacity to produce approximately 15 million lb. of Buna-N synthetic rubber and high styrene latex annually. United States Rubber Co. plans to expand production facilities so that the plant will manufacture more than 30 million lb. of Buna-N synthetic rubber, high styrene latex, and the new rubber-plastic blends annually.

Vinyl Trim for Autos

USED throughout the interior of Kaiser-Frazer's new "Henry J" automobile is a vinyl trim called Dragon Skin. The new pattern is used on door and side panelling, and in color-blended combination with both wool and plastic woven upholstery. It is manufactured by L. E. Carpenter & Co., Wharton, N.J. from Geon plastisol-coated fabric on which an abstract lizard-alligator design is deep-grain embossed.

Laminate with Unwoven Cotton

A NEW phenolic laminate reinforced with unwoven cotton fibers, random laid in the form of a mat, has been announced by The Richardson Co., Melrose Park, Ill. This laminate features uniformity of strength in all directions, outstanding machinability, and improved texture.

The new laminate, designated Insurok Grade T-815, is primarily intended for mechanical applications requiring uniform strength throughout, such as non-metallic gears, cams, pinions, textile bobbin heads, and many other industrial parts. The structure of grade T-815 results in a uniformity of strength (tensile impact, and flexural) in the main direction, cross direction, and at all intermediate angles throughout the plane of the material. The physical characteristics are rated as better than high-strength, woven cotton fabric-base materials.

Machinability of Grade T-815 is excellent, and machined surfaces have a finish superior to any woven cotton fabric-base laminate made, according to the producer. The new laminate also has good electrical and moisture-resistant properties—an improvement over ordinary cotton fabric-base materials.

Plastics in the Future Automobile

IN a recent talk on the use of chemicals in the automotive industry, H. B. McClure, vice president of Carbide and Carbon Chemicals Div., Union Carbide and Carbon Corp., pointed out the following vinyl and phenolic items as some of those most likely to increase or be further developed in automobile construction. Said Mr. McClure:

The latest trend in "hardtop convertibles" is the use of decorative vinyl sheeting over the steel top.

Important items that are now service-proved but not used throughout the entire industry include the clear flexible vinyl convertible rear window, vinyl upholstery, and rigid installations of vinyl plastic coated on paper or cloth. Wider use of extruded vinyl upholstery welting will make for greater durability.

Plastic convertible tops are on the way because they outlast the present double-textured top, are available in a wide range of colors, are really water-proof and will not mildew, can be cleaned easily, and cost less.

Vinyl plastic may also be used for overhead linings where it offers the same advantages as those just mentioned for convertible tops. Vinyl slip covers, including saran, are growing in use so rapidly that in many cars the original upholstery is seen at the time of the original sale and never thereafter until resale.

Phenolic-bonded honeycomb construction will make light-weight, strong, and low-cost panels. New "tripolymer" plastics of extremely high mechanical strength are available. Interior frames and panels can

PLASTISCOPE

be formed without the giant presses required for metal drawing. Plastic-saturated glass fiber can also be molded into a great variety of strong, lightweight shapes that will be of value for interior structural parts.

Plastic foams will be useful as sound and heat insulation.

Plastisols can be used as sealing compounds and protective flexible sleeves of great variety in electrical circuits. These plastisols can be flowed into a joint and hardened during the baking operation, or electrical parts can be dipped and heated to provide a durable coating.

The use of extruded, flexible vinyl plastic fender welting has been proved, and similar extrusions will no doubt soon be used in all window channeling. Not only does this material resist the elements, but it is available in an unlimited color range to match body colors. Its use as rear window gaskets would eliminate the need for a protective strip now used to cover the gasket surface and would thus provide a saving in material and labor cost.

Film in Toys

CONSUMPTION of 5 million lb. of vinyl film in the production of toys in 1950 is an industry record recently announced by Clyde O. DeLong, general manager of the plastic products division of The B. F. Goodrich Co.

Mr. DeLong said that among the many items using this unprecedented amount of film were the Koroseal play pond and all types of inflatable toys, dolls, punching bags, pistol holsters, and cowboy chaps.

Insulating Product

DESIGNED especially for 60-cycle work, a new laminated plastic has just been announced by The Formica Co., Cincinnati 32, Ohio. To be known as Z-80, the new Formica insulating material combines in one grade three useful properties: high arc resistance, good dimensional stability, and low power loss at 60 cycles. In addition, the new Z-80 is said to have good punching and excellent machining qualities.

It is believed that the Z-80 material is the first ever designed specifically for 60-cycle application. Formica sales engineers predict that their new laminated plastic insulating material will be welcomed in the radio-T.V. industry for use in condensers and adaptors where extremely low loss at 60 cycles is required. It probably will fill a similar need in the power generating field.

Z-80 is made of a coarse weave fabric, bonded with arc-resistant resin. It is available in sheet form from $\frac{1}{32}$ to 1-in. thick, natural color, and semi-gloss finish. It can be laminated-molded to a wide variety of shapes.

Z-65, a similar material but with a paper base, is being introduced concurrently with the Z-80. Samples of both materials—together with complete engineering data sheets—will be sent on request.

Research Dangers

WITH the armed services having something on the order of $2 billion a year at their disposal for reseach and development, or about twice the total available to industry and universities, the government-sponsored research must involve the effort of a large proportion of the scientists and engineers of the country, according to E. R. Gilliland, 1950 winner of the Celanese Corp. of America Professional Progress Award in Chemical Engineering. Dr. Gilliland made this statement in his acceptance address before the annual meeting of the American Institute of Chemical Engineers at Columbus, Ohio, and went on to say that "there are several aspects of this problem that are dangerous. First, there is a tendency to channelize research and development work into certain research fields at the expense of others of equal importance. In fact, some of the neglected fields will probably be of more importance in a real emergency than some of those being actively pushed. Second, a considerable portion of it is not research, but is development work."

The speaker further said that he doubted whether the military services have sufficient background in the evolution of modern science and engineering to direct a major part of the research effort of the country even for their own greatest benefit.

The Celanese award winner is now Professor of Chemical Engineering at Massachusetts Institute of Technology and during World War II was Assistant Rubber Director in charge of research and development work.

Polyethylene Rope

ROPE made from twisted polyethylene film has been announced by Plastic Rope Co., Inc., 2581 Spring St., Redwood City, Calif. The producer asserts that the U. S. Navy has samples under test and is particularly interested in such qualities as floating; flexibility at temperatures down to 70° below zero; stretch without snap-back; return to original size in both thickness and length after stretching; weather resistance; and particularly resistance to salt water, acids, solvents, fungus, and molds that are damaging to manila rope.

Civilian firms are interested in its use particularly for use in fish nets and in lumbering, petroleum, and marine operations.

The ropes are from $\frac{1}{8}$ in. to 2 in. in diameter and of standard rope construction.

Vinyl Packaging Film

AMONG the materials recently reviewed by the Food and Drug Administration of interest to the plastics industry is a list of plasticizers, stabilizers, and resins that have had adequate study to warrant classifying them as non-toxic. The Administration points out that it has no authority to give formal or official approval to such products but is willing to release such information, for benefit of the industry. The list follows:

Plasticizers—

Ethyl phthalyl ethyl glycollate
Tertiary butyl salol
3 (2-xenoxyl) 1, 2-epoxypropane
Octyl diphenyl phosphate
Butyl phthalyl butyl glycollate
Glycerol monooleate

Of the phthalates, the di-2-ethyl hexyl phthalate only appears to be suitable as a plasticizer in food wraps for fresh vegetables, frozen foods, cheese, and lean meats such as lamb and beef, but not suitable

styron *qualified* for the job!

ARE YOU faced with a "Help Wanted" problem? Such was the case when Fresh'nd-Aire Company decided to market a distinctively styled floor circulator. Calling upon the services of specialists in industrial designing, the Fresh'nd-Aire Company presented their basic problem, which was to design a floor circulator that would be attractively colored and styled . . . constructed with a safety guard and with special design lines to provide a comfortable air flow.

Blueprints were drawn up that incorporated these features. However, these design and styling lines presented a production problem involving assembling . . . finishing and material costs. Some materials cost too much while others did not meet the necessary physical requirements. It was finally decided that a plastics material was the ideal solution. Using to full advantage the services offered by the Custom Molder and Dow's Plastics Technical Service, the Fresh'nd-Aire Company selected Styron (Dow polystyrene) as the material best suited for the job.

Dow will help you select a Custom Molder who can solve your design and production problems. For extensive information on the properties and performance of Dow Plastics, write today for technical bulletins or advice from Dow's Technical Service.

STYRON CUTS FINISHING COSTS: No painting or finishing operations are required with Styron because surface color goes all the way through. Exact color matching of individual parts was possible in two-tone circulator. Finish stays bright and new looking after shipping and storage because Styron's colors won't chip or peel.

SIMPLIFIES ASSEMBLY: Grille work and cowl of floor circulator are mass produced in one-shot moldings. This eliminates additional assembly operations and reduces total production costs. The dimensional stability of Styron permits the maintenance of extremely close tolerances necessary to the design of the fan assembly.

IMPROVES APPEARANCE: Styron made possible the attractive color and styling features that make this floor circulator outstanding in today's market. A special safety guard and design lines to provide uniform air flow were easily molded with Styron.

Plastics Division—Dept. MSOT-4

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STYRON

DOW plastics

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for wrapping fatty foods such as margarine, butter, lard, and bacon.

Stabilizers—
- Calcium oleate
- Calcium stearate
- Calcium ricinoleate
- Di-sodium hydrogen phosphate
- Zinc stearate
- Calcium acetoacetate

Resins—
- Polystyrene resins
- Polyvinyl resins
- Polyethylene resins
- Vinylidine chloride
- Vinyl chloride
- Cellulose acetate
- Hycar OR25, a rubber base plastic.

Safety Award

THE Newark plant of Celanese Corp. of America has been granted the highly coveted Distinguished Service to Safety Award by the National Safety Council. For a period of more than 16 months—June 2, 1949 to Oct. 13, 1950—the Newark plant operated without a single lost-time or disabling injury to any of its employees.

Acrylic Cleaner

REMOVAL of masking tape and other foreign matter from acrylics can be accomplished by use of a liquid cleaner, called Rez-N-Kleen, especially formulated for this purpose. Manufactured by Schwartz Chemical Co., Inc., 326 W. 70th St., New York 23, N.Y., it is also recommended for cleaning transparent acrylic aircraft parts such as windows, side blisters, turrets, and gunners' domes.

Plastic Gimp

A PLASTIC gimp, claimed to be the first made from vinyl, has been developed by The Rex Corp., 51 Landsdowne St., Cambridge, Mass. Formerly, the only all-plastic gimp was made from pyroxylin, but the producer of the new vinyl material claims it has limited the stretch which had been hindering attempts to produce a vinyl gimp.

Plans for merchandising this vinyl gimp, called either Rex-Lace or Rex-Cord, have been placed under the direction of C. S. Vaughn, formerly of Exacto Corp., and handicraft purchasing agent and advisor to the National Council of the Boy Scouts of America. Rex will furnish a book of instructions for handling this material in craft weaving, braiding, knotting, and so forth. It is now used primarily for lanyards, belts, shade pulls, hat bands, and the like, but the booklet gives a multitude of ways in which the material can be used by craft workers.

Phosphorescent Pigments

TWO new phosphorescent pigments for use in plastics are now available on a production scale from Rhode Island Laboratories, Inc., West Warwick, R.I. One type, Violite Blue 3-60, has a blue light emission and an afterglow of 8 to 10 hr., while the other type, Violite Light Blue 18-50, has a light blue light emission and an afterglow of 8 to 12 hours. Both pigments have a grayish white daylight color and a very quick response to any exciting light source. Both pigments are particularly suited for use in thermoplastic resins such as acrylic, styrene, vinyl acetate, and polyvinyl chloride and copolymer.

Butyral Tablecloths

MORE than 250,000 lb. of polyvinyl butyral were used for solution coating of tablecloths in 1950, according to one producer. About 500,000 yd. of tablecloths were coated with this material.

COMPANY NOTES

Anchor Industrial Co., 533 Canal St., New York, N. Y., is a new organization formed to take over all sales in the television field from **Anchor Plastics Co., Inc. Richard A. Fisch** is owner of the concern.

Shaw Insulator Co., Irvington, N.J., has announced that **Stanford H. Shaw** has been appointed sales manager and **George A. Johns** has been retained as sales consultant.

Victory Mfg. Co., 1722 W. Arcade Pl., Chicago, Ill., has stepped up its injection molding capacity through the addition of two 32-oz. and two 60-oz. Hydraulic Press Mfg. Co. presses and one 32-oz. Reed-Prentice unit. The firm's expansion program also includes increased facilities for finishing and assembly operations.

Correction: P. R. Mallory Plastics, Inc., 3670 Milwaukee Ave., Chicago 41, Ill., is the new name of **Plastics Molders, Inc.**, Chicago, and not of **P. R. Mallory and Co., Inc.**, as erroneously reported in these columns in our January issue. P. R. Mallory and Co., Inc., purchased Plastic Molders, Inc.

Adamson-United Co., Akron, Ohio, has announced the following personnel changes: **Norman J. Elder** has been named manager of the Calender Div.; **Harold P. Lamb**, manager of Project Engineering; **R. C. Seanor**, chief engineer; and **G. S. Andrus**, senior engineer.

Livingstone Engineering Co., Worcester, Mass., has appointed **John Baizley Co., Inc.**, 1325 Widener Bldg., Philadelphia, Pa., as district sales representative to handle the sale of the firm's line of boilers and cleaners.

The Plas-Tex Corp., Los Angeles, Calif., has announced the promotion of **Joseph M. Jayne** to vice president, **Frank Segreti** to assistant treasurer.

Franklin Jeffrey Corp., 1671 McDonald Ave., Brooklyn, N. Y., is under the complete and sole ownership of **J. S. Brody**, who has announced that an additional production line for the manufacture of cellulose acetate molding powder has been put into use. The company also reworks scrap acetate.

Roger Williams, Inc., has moved to new offices at 148 E. 38th St., New York 16, N. Y.

The W. W. Sly Mfg. Co., 4700 Train Ave., Cleveland 2, Ohio, has appointed **Horrell Co.**, 8006 Melrose Ave., Los Angeles, Calif., to act as sales engineer for its industrial dust control and sandblast equipment.

Baker Castor Oil Co. has announced the following appointments: **Donald S. Bolley** as director of research; **M. Kent Smith** as director of development; and **Russell Hayes** as chief of the engineering department.

Ohio-Apex, Inc., of Nitro, W. Va., is being acquired by **Food Machinery & Chemical Corp.**, San Jose, Calif.

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The latter company is thus planning to expand its chemical business which had formerly been confined to heavy industrial and agricultural chemicals. There will be no changes in management personnel of Ohio-Apex, long a prominent manufacturer of dioctyl phthalate and other plasticizers.

The Baker Castor Oil Co., New York, N. Y., has appointed two new sales agents. **W. Ronald Benson, Inc.**, 558 First Ave., S. Seattle, Wash., will cover the state of Washington, and **Western Chemicals, Inc.**, S. W. Gibbs St., Portland, Ore., will handle business in Oregon.

PERSONAL

C. B. Walworth has been appointed supervisor of glues and industrial resin technical service for **Plaskon Div., Libbey-Owens-Ford Glass Co.**, Toledo, Ohio.

Murray Tribbett has been named chief engineer of the **Hydraulic Press Div., The French Oil Mill Machinery Co.**, Piqua, Ohio. He was formerly with The Hydraulic Press Mfg. Co.

Clifford W. Stuart has been elected president, general manager, and director of **Jackson & Church Co.**, Saginaw, Mich. He succeeds **David L. Perrot** who becomes chairman.

Edwin Gross has joined **Plastics Calendering Corp.**, Farmingdale, L. I., N. Y., and will be in charge of the light-gage sheeting division.

Robert A. Miller has been appointed sales manager for the **Gear Coupling Div., Sier-Bath Gear & Pump Co., Inc.**, 9252 Hudson Blvd., North Bergen, N. J.

J. Clarke Cassidy, Jr., has been named technical sales representative for **Cox Plastics Corp.** and **Atlas Plastics, Inc.**, both located at 162 Colgate Ave., Buffalo 20, N. Y. The former company does custom vinyl sheet fabricating and compression molding, and the latter custom low-pressure molding and laminating and casting of thermosets. Mr. Cassidy will handle direct sales in New York, Pennsylvania, Ohio, Michigan, and Ontario, Canada.

Dr. D. S. Frederick, vice president of **Rohm & Haas Co.**, has been elected to a newly created directorship of **The Manufacturing Chemists Association, Inc.**

George C. Nielsen has been named sales representative in the Cleveland area for the **Polychemicals Dept., E. I. du Pont de Nemours & Co., Inc.**

William H. Wilson has been named president of **Wil-Pak Packing Products, Inc.**, Empire State Building, New York 1, N. Y. The firm specializes in moisture-vapor-proof bags, water-proof case liners, and allied packing materials for government and commercial applications.

Edward F. Joyce has been appointed manager of the eastern division of **Thermacote Co.**, 320 Jefferson St., Newark, N. J., in charge of sales and plant production.

Vincent R. Tearle, formerly vice president of Clear Pak, Inc., has been appointed sales manager of the transparent container division of **Alexander Rudnick & Son**, 476 Broome St., New York 13, N. Y.

William A. Bohlander has been named factory manager of **The Hydraulic Press Mfg. Co.**, Mount Gilead, Ohio.

Charles H. Cox, Jr., has been appointed purchasing agent for **Synthane Corp.**, Oaks, Pa. He has been with the firm for 16 years.

E. Bowman Stratton, Jr., former chief of development, Relief Map Div., Army Service, has joined **Industrial Radiant Heat Corp.**, Gladstone, N. J., to further develop the process of forming thermoplastic sheet materials.

Raymond F. Clark has been named vice president in charge of the **Industrial Products Div., Hess, Goldsmith & Co., Inc.**, 1400 Broadway, New York 18, N. Y., producer of industrial glass fabrics.

Mark K. Howlett of **General Electric Co.'s Chemical Dept.**, has been appointed silicone sales supervisor with headquarters at Waterford, N. Y.

John E. McKeen, president of **Chas. Pfizer & Co., Inc.**, Brooklyn, N. Y., has been named chairman of the board. He will remain as president of the chemical firm.

William I. Burt, vice president of **B. F. Goodrich Chemical Co.**, was elected vice president of the **American Institute of Chemical Engineers** for 1951 at its 43rd annual meeting at Columbus, Ohio.

Deceased

William Brown Bell, president of **American Cyanamid Co.**, 30 Rockefeller Plaza, New York 20, N. Y., died at the age of 71. He was president of the firm from 1922, and was on a business trip abroad at the time of his death.

MEETINGS

Feb. 28-Mar. 2—Reinforced Plastics Div. Meeting, 6th Annual Technical Session, The Society of the Plastics Industry, Edgewater Beach Hotel, Chicago, Ill.

Mar. 5-6—Annual Meeting, The Society of the Plastics Industry (Canada) Inc., Mount Royal Hotel, Montreal, Quebec.

Mar. 5-9—American Society for Testing Materials, Spring Meeting, Cincinnati, Ohio.

Mar. 13-16—National Association of Corrosion Engineers, 1951 Conference and Exhibition, Hotel Statler, New York, N. Y.

Mar. 25—Worcester-Leominster Chapter Meeting, The Society of the Plastics Industry, Sterling Inn, Sterling, Mass.

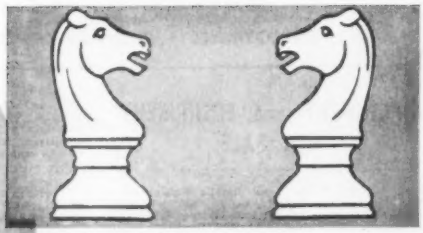
Apr. 16—Semi-Annual Meeting, The Packaging Machinery Manufacturers Institute, Hotel Dennis, Atlantic City, N. J.

Apr. 17-20—American Management Association, 20th National Packaging Exposition, Auditorium, Atlantic City, N. J.

S. P. E. Meetings

Feb. 12—Upper Midwest Section of S.P.E. at Esslingers' Cafe, 1927 University Ave., St. Paul, Minn. A program dealing with "Polyethylene Molding and Coating" will be arranged by J. H. Kugler.

Left-hand chessmen hobs are milled from right-hand masters on this CINCINNATI 8" x 18" Tool and Die Miller equipped with Reverse Image Attachment.



Chessmen milled on the equipment illustrated here.

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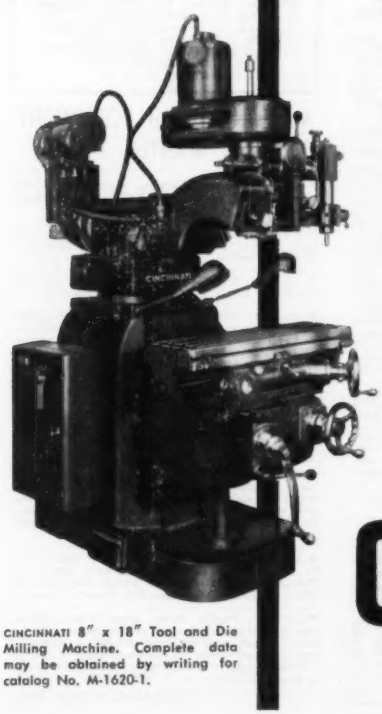
Milling a Left-Hand Hob from a Right-Hand Master

. . . and getting Fine Detail all around

A left-hand hob, copy milled from a right-hand master . . . fine detail reproduced on all four sides! These are the cost-reducing advantages offered by CINCINNATI 8" x 18" Tool and Die Millers with the equipment illustrated above. The "Reverse Image" attachment on the machine table automatically reverses the hob being milled, right-hand to left-hand, or vice versa. The two manually controlled Circular Milling Attachments allow the operator to position the work and master to obtain the most accurate reproduction of detail on all four sides. ¶Standard machine features also contribute their share to the faithfully reproduced reverse image hobs. The depth control unit is automatic, hydraulically operated, and responds to a few ounces pressure. The spindle head can be swiveled forward and back about a pivot point near the end of the cutter. Antifriction feed screws greatly reduce operating fatigue. ¶Additional information about CINCINNATI 8" x 18" Tool and Die Milling Machines may be obtained by writing for literature. Brief specifications will be found in Sweet's.

THE CINCINNATI MILLING MACHINE CO., CINCINNATI 9, OHIO



CINCINNATI 8" x 18" Tool and Die Milling Machine. Complete data may be obtained by writing for catalog No. M-1620-1.

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FOR SALE: 50 Ton Stokes Presses & Pump, 200 Ton W.S. Hobbing PRESS, 200 Ton W.S. PRESS 24 x 20 Platen, 175 Ton H.P.M. PRESS 30 x 30 Platen, 150 Ton Farrel PRESS 20 x 20 Elec. Plates. 140 Ton W.S. PRESS 23 x 17 Platens, 85 Ton Stewart Boiling PRESS 20 x 20 Platen, 50 Ton Elmes PRESS with 15 x 18 Elec. Plates, 75 Ton W.S. PRESS 15 x 15 Platen, 75 Ton Adamson PRESS 20 x 20 Platens. Laboratory Presses, Accumulators, Piston and Oil Pumps. AARON MACHINERY CO., INC. 45 Crosby St., N.Y.C

FOR SALE: Thermex Preheater, Model 2P; Airtronics Preheater, Model D E; Airtronics Preheater, Model C B. Like new. AARON MACHINERY CO., INC. WOrth 4-8233 45 Crosby St., New York 12, N. Y.

We handle hydraulic presses, pumps, and power units of all sizes. Write us your requirements and we will try to help you. We find it impossible to list our equipment in this classified column due to the fact that the equipment is sold before ad is published. For those who seek action look in the New York Times under the Machinery and Tool Column for our regular Sunday Special. Hydraulic Sal-Press, Inc., 386-90 Warren Street, Brooklyn 2, N.Y. MAin 4-7347

FOR SALE: Ball & Jewell Cutters #1, #2, #2½, Double Arm Jacketed Mixers 25 gal. to 250 gal. Stokes Rotary 16 punch pellet presses. PERRY EQUIPMENT CORP., 1529 W. Thompson St., Phila., 21, Pa.

FOR SALE: One ounce IMPCO molding machine complete with molds and loading devices for manufacture of plastic topped tacks. Reply Box 828, Modern Plastics.

FOR SALE: Injection molding machines Lester type. One 2 ounce; ten 4 ounce; one 6 ounce. All in excellent running condition. Reply Box 827, Modern Plastics.

FOR SALE: Injection Presses: 4, 6 & 8 oz Reeds, 4, 9 & 40 oz HPM, 6 oz Grotelite, 3 oz Monroe, 1-Cumberland No 1½ scrapgrinder. 1-Lonike Plasti-He-Treat Dryer, 2 Impco Mold Temp. Circulators. 1-6 vert. draw. Preheat Oven for 4'x5' Sheets. 2-300 tons HPM Compression presses, also other sizes. 1- Stokes T Preformpress. 1- Nash Rotary Edger. 1- Eclipse 3HP gas boiler. 1 - Johnstone Scoreslitting & winding machine 52". 1- Sheet Die for No 2½"NRM, take up & cooling unit. 1- Wilson 37F Air Forming press. Justin Zenner, 822 W Waveland Ave, Chicago 13, Ill.

FOR SALE: 2 Ball & Jewell #1½ Stainless Steel Rotary Cutters. 30 HP Motors—1—Thropp 10"x24" Plastics Mill with chrome plated rolls, and explosion proof motor. Also Extruders, Compression and Injection Molding Presses, Mixers, etc. Send us your inquiries. Reply Box 852, Modern Plastics.

FOR SALE: 9-oz. H.P.M. injection molding machine new 1943 used very little. Motor and pump rubber mounted. Price $10,500.00 F.O.B Toledo. Lanfare Molded Products R5-Box 159 Toledo 6, Ohio

IMMEDIATELY AVAILABLE
12-oz. LESTER PHOENIX INJECTION MOLDING MACHINE, Type 175, new '43 excellent condition, used six mos. w/motor . . . $13,900. Can be seen operating. Box 842, Modern Plastics

PRICED TO SELL
INJECTION MOLDING MACHINES

22-oz. REED Mod. 10H, new '46	$19,500.
48-80 IMPCO Injector, '45 used in conjunction with std. plastic press	11,500.
16-oz. REED Mod. 10E, new '46	Offers
6-oz. WATSON STILLMAN, new '42	5,500.
6-oz. LESTER PHOENIX Mod. LPM 2B '44	9,500.
4-oz. REED Mod. 10-A, '41	5,500.
4-oz. LESTER (7) Mod. IBX & Mod. ML '41	8,500.
4-oz. LESTER Mod. 1-V-4 Vertical '43	4,950.
2-oz. REED, new '37, extras	3,900.
2-oz. LESTER, Mod. IBX (4) late	5,900.

HYD. PLASTIC PRESSES

700 & 300 Ton D & Boschert	2,950 & up
200 T FARREL 24x24" platen	1,750.
360 T SOUTHWARK rebuilt	2,450.
260 T SOUTHWARK, self contained	Offers
250 T H.P.M. 45" St. 14" ram 38x33" pl.	2,300.
200 T H.P.M. Self contained	9,850.
100 T ADAMSON 12" St. 16"x20" pl.	695.
100 T FARREL Self contained	1,950.
75 T STANDARD new '40 Vert. & Horiz. Hyd. Str.	1,975.
75 T D. & BOSCHERT 8" St.	800.
50 T JOHNSON 16" Str., 30"x30"	2,250.
NEW PLASTIC TRY-OUT SCREW PRESS	1,200.
STOKES Mod. 200D2 & Mod. F.	Offers

MISC.

1½ oz. PLASTIC NAIL or TACK HEADING MCH.	Offers
FALES Clickers, Style C, new '47	1,250.
Pulverizer & Disintegrater, 20 HP	950.
SELECTO Mod. VA Screener, new '45	600.
VACUUM PUMP I.R. 18"x6"	650.
LANCASTER Powder Mixers, Mod. SKG (3) each	750.
PHENOLIC Powder Plant complete with equipment & facilities	Offers
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Universal Hydraulic Machinery Company, 285 Hudson Street, New York City 13, N. Y.

TWO LOOMIS PRESSES AVAILABLE! One 24"x56" Platen Press Unit for LAMINATING or SHEET POLISHING. One 36"x47" Moving Platen 600 Ton Press for MOLDING or OTHER USE; self-contained, semi-automatic, 30"x40" steam platens, bolsters, 20" stroke, knockouts, pullbacks, fast acting. For Complete Specifications & Inspection Contact: EVARTS G. LOOMIS CO., 128 So. 14th St., Newark 7, NJ.: HUmboldt 2-5041.

FOR SALE: Van Dorn Injection Molding Machine, One Ounce, Automatic Model H-200 Serial #1040. Three Years Old But Used Only Seven Months. Perfect Condition FOB McKees Rock, Pa., Crated. A Steal At $750.00. Paulus, Inc., Helen & Robb Streets, McKees Rocks, Pa.

FOR SALE: Complete wood flour mill. Capacity 10 tons per 24 hours, using nearby supply of pine and poplar. For further particulars address Box 849, Modern Plastics.

FOR SALE: Ball & Jewell Rotary Cutters—#0, #1, #1½ S.S. with 20 HP Motor and #2 with 40 HP Motor—Rubber Mill 6"x18" with drive & 5 HP motor, with safety bars—Calenders, Extruders, Presses, Mixers, etc.—Send Us Your Inquiries. What Have You For Sale? For Better Buys and Service Call South 8-4451—9264—8782. You can BANK On the Equipment Clearing House, Inc. 289 10th Street, Brooklyn 15, N.Y.

FOR SALE: 200 ton Baldwin Molding Press 32"x37" platens with push back cylinders 12" stroke; 200 ton Molding Press 24x54", 14" ram, 24" stroke: 50 ton French Oil Molding Press 12x12, 7" stroke; 15 ton Stokes Automatic w/5 H.P. motor; 50 ton Watson-Stillman Press down moving 28x28 platens 15" stroke with pump & accumulator; Vickers V-460 Pump w/20 H.P. motor. LUNNEY-CARSON CO., 2829 No. Broad St., Philadelphia 32, Pa. BALdwin 9-5932

FOR SALE: Sheridan #17 Embossing Press (54x26) with automatic feed and rewind attachment and automatic dwell attachment. Used only one month. Reply Box 850, Modern Plastics.

AT GREAT SAVINGS
Stokes and Colton 3RP Rotary Tablet Machines.
Mikro 1SH, 2TH & 4TH Pulverizers; Jay Bee, U1 & 3AT, Schutz-O'Neill, Stedman, Riets Mills.
Fitzpatrick Stainless Steel D Comminuter.
Baker Perkins & Readco Heavy Duty BB and JNM 50, 100, 150 gal. D.A. Mixers.
Baker Perkins 100-150 gal. Vacuum Mixers.
J. H Day 75 & 35 gal. Imperial D. A. Jacketed, Sigma Blade Mixers.
Hobart & Read Vertical Mixers, with removable bowls.
Day & Robinson 100 up to 4000 lbs. Dry Powder Mixers.
Package Machy. FA, Miller, Hayssen 3-7 Auto. Cellophane Wrappers.
Available For Immediate Delivery. Equipment Is Rebuilt and Guaranteed.
UNION STANDARD EQUIPMENT CO.
318-322 Lafayette Street
New York 12, N. Y.

MACHINERY and EQUIPMENT WANTED

New Mfr. wants injection molding machines also extruding equipment. Will pay good prices. Reply Box 824, Modern Plastics.

WANTED: Extruders, 2½" and 3½", any type. Please submit history. Reply Box 844, Modern Plastics.

WANTED: 4 oz. to 32 oz. injection molding machines. Reply Box 845, Modern Plastics.

WANTED: STOKES Model S or equal, single punch preform 25 Ton. STOKES 280 F Defiance 45 Preforming Press 100 T—200 T down stroke Plastic Press, S. C. platen 24x24 min. daylight 18" w/hyd. up-acting knock-outs. INJECTION MOLDING MACHINES 16-Oz REED, late, 4-Oz. & 6-Oz WATSON STILLMAN. Reply Box 847, Modern Plastics.

MATERIALS WANTED

WANTED: PLASTIC Scrap or Rejects in any form. Acetate Butyrate, Polystyrene, Acrylic, Vinyl Polyethylene, etc. Also wanted surplus lots of phenolic and urea molding materials. Custom grinding, magnetizing and compounding. Reply Box 821, Modern Plastics.

WANTED: PLASTIC SCRAP or REJECTS in any form: Cellulose Acetate, Butyrate, Polyethylene, Polystyrene, Vinyl, Acrylic and Ethyl Cellulose. Reply Box 823, Modern Plastics.

WANTED: Plastic Scrap, Rigid Vinyl, Cellulose Acetate, Polystyrene, Polyethylene, Butyrate, Custom grinding, magnetizing, compounding, and straining of contaminated plastics. Franklin Jeffrey Corporation, 1671 McDonald Avenue, Brooklyn, N. Y. ES 5-7943.

(*Continued on page 186*)

CLASSIFIED ADVERTISING

(*Continued from page 184*)

SURPLUS UREA MOLDING POWDER WANTED. Reply Box 825, Modern Plastics.

WANTED: Titanium Dioxide Pigments (any grade) needed to carry on our business. Not interested in any 85¢ or 95¢ Black Market deals. Would appreciate a few bags from manufacturing concerns who can possibly spare some. Will pay any reasonable premium or exchange for other critical chemicals. Samuel Smidt Chemical Co., 410 Frelinghuysen Ave., Newark, N. J.

WANTED: Your Scrap Vinyl, Polyethylene, Polystyrene, Acetate, Ethyl Cellulose, and etc. OFFERING: Reprocessed Granulated Plastic, Custom Grinding, and Straining. Reply Industrial Plastic & Textile Company, 71 Woolsey Street, Irvington, N. J.

WANTED: Surplus Virgin Polystyrene, polyethylene, vinyl & cellulose acetate from mfgr only. Large odd lots. Regular shipments of any size preferred Call WH 3-1616.

HELP WANTED

Well established midwest injection molding company is expanding its sales program. Representatives wanted for New York State, New England States, Eastern Seaboard and west of Mississippi. Must be experienced, have good record and capable of handling thermoplastic material problems in territory worked. Standard commission basis. Give full qualifications. Reply Box 831, Modern Plastics.

WANTED for plastic molding plant in Florida—Molding Supervisor, with thorough knowledge of plastics business, experienced in operation of 12 ounce Watson-Stillman machine. Reply give full resume of past experience. Reply Box 832, Modern Plastics.

ASST TO PRODUCTION SUPERVISOR of sheet forming and precision fabricating of all Thermoplastics. Must be self starter, able to estimate and supervise production jobs. Also development work. Excellent opportunity to take over fabrication dept. Give detail resume and salary. Reply Box 833, Modern Plastics.

INJECTION ENGINEER: Established manufacturer of molded plastics needs an engineer experienced in process work in injection molding of plastics. Expansion of plant offers excellent opportunity to right man. Requirements are technical training and two to five years experience in injection molding operations. Reply giving full details of experience, training, and salary requirements. Box 835, Modern Plastics.

SALES MANAGER: A leading manufacturer of molded plastics needs an experienced sales manager. Products are primarily industrial components. Requirements are an engineering college degree with five to ten years experience in industrial sales and sales management.

Reply giving full details of education, experience, and salary requirements. Box 836, Modern Plastics.

EXTRUSION ENGINEER: Mid-west plastics manufacturer needs experienced man to take charge of extrusion engineering. Requirements are a technical college degree or the equivalent in experience and training.

Reply giving details of experience, personal data, education, and salary requirements. Box 837, Modern Plastics.

CHEMIST or CHEMICAL ENGINEER: Experienced in the production of, or laboratory control and development of, Phenolic varnishes or molding compounds. Give complete qualifications in writing. All replies will be treated confidentially. Excellent opportunity with well-established company. Our employees know of this advertisement. Reply Box 841, Modern Plastics.

GENERAL MANAGER

Industrial custom molded plastic plant. To coordinate manufacturing and sales for nationally recognized company. Salary open. Replies held in strict confidence. Employees know of ad. Reply Box 851, Modern Plastics.

UNITED KINGDOM

Works Manager required for North-East Factory specialising in Extrusion of all thermoplastic material with particular experience in the container and packaging business. Applicants must be able to design tools and set up machines. Apply stating experience and salary required to: General Manager, Thomas De La Rue & Co. Ltd. Plastics Division, Imperial House, 84/86 Regent Street, London, W.1., England.

SALES EXECUTIVE

Plastics Raw Material Mfg. seeks experienced man to develop contacts to industry and government agencies.

Our facilities include the compounding of thermo plastics as well as the reclamation of scrap and by-products of the plastics and resin industry.

The man we need must be able to head new division seeking to obtain prime and subcontracts for the defense program. Must be willing to travel. Salary open.

Write stating complete background and qualifications. Replies held strictly confidential. Our employees know of this ad. Reply Box 848, Modern Plastics.

SITUATIONS WANTED

PLASTICS ENGINEER: Ch. E.—Reinforced products, glass and other molded, laminated, contact, pressure. Product and tool design, equipment, methods, layout, training, administration. Development, production or project engineering. Also experienced extrusion, processing, planishing, fabrication, wire insulation, testing, hydraulic equipment, five years in plastics, almost nine years other responsible technical work. Reply Box 828 Modern Plastics.

PLANT MANAGER OR SUPERVISOR, eleven years in injection and two years in extrusion, recently returned from South America where I set up and operated a modern plastic plant, desires position. Knows plant lay-out, injection machines, molds and their repair, fabrication, etc. Also has many year's experience as engineer in other lines. Reply Box 839 Modern Plastics.

CHEMIST SEEKS PARTNERSHIP in plastics or related field. Ph. D., 35. Broad experience includes synthesis, polymerization, compounding, processing of vinyls, styrene, acrylics, polyesters, synthetic rubber, celluloics; molding, extruding, laminates, coatings, latices, adhesives. Some knowledge of business, sales, production management. Will give up pleasant, responsible position to get into business. Capital available. Any location considered; N.Y.-N.J. preferred. Box 840, Modern Plastics.

MISCELLANEOUS

MATERIAL FOR SALE: 289 sheets Red Vinylite, 96 sheets White Vinylite priced at $1.45 per sheet; 119 sheets White Plastacele priced at $1.80 per sheet. All 21x51x.020 Pressed Polished both sides. R. W. Kerr Plastic Co., Hastings, Nebraska.

MATERIAL FOR SALE: 2500 pounds maroon virgin styroloy molding materials. Can be used for either extrusion or injection. Slightly lighter in shade than standard maroon poly. Mr. Irving, Bernard Edward Company, 5252 South Kolmar, Chicago 32, Ill.

We are in the market to buy moulds. What have you got to offer.
Penholder Mould, Toy Moulds, Comb Moulds, Tableware Moulds. Please give full particulars. Reply Box 829, Modern Plastics.

FOR SALE: Virgin Polystyrene & Polyethylene scrap to mfgrs & exporters only. Regular shipments or special lots. WH 3-1616.

WANTED to buy 4 cavity mold to produce 6 or 7 oz. tumblers. State details of mold and price. Send sample if possible. Reply Box 838, Modern Plastics.

FOR SALE: One Mold for five pocket size hairbrush and three clothes brushes. For 8 oz. injection molding machine. THE SERVETTE CORP., 595 Madison Ave., N.Y.C.

PATENT, new (2,531,218), covers ingenious, inexpensive method of Fluid Molding, suited especially to fabricating large hollow objects. Eliminates difficult, expensive techniques of bag and diaphragm molding. Patent for sale or will license.
T. L. Johnson, Pres., Armor-Flex Co., 8 Garden Lane, Kirkwood, Mo.

Manufacturers Attention! PLASTIC PULLEY FISHING FLOAT (Patented). Troll back and forth from anchored boat in current. Adjustable stop regulates depth of hook to 25 feet. Float shows position of hook with respect to bottom. Royalty basis. J. J. Kirschman, 223 Oriental Ave., Atlantic City, N. J.

FACTORY BUILDINGS: Several N.E. Penna. factory buys—priced to sell. Immediate possession. For details, write: KOEHLER-MARVIN REALTY ASSOCIATES, INC., Bartonsville, Pa.

HIGHLY PROFITABLE FLASH LIGHT PATENT No. 2,530,505. This choice product design, in a field of fifteen million per year production, offered for sale or license. Very lowest manufacturing cost makes this the most important patent in the flash light industry. In fact, it may be the most valuable patent available to American Industry today. It will enable its manufacturer to under-sell all competition in the quality field. Minimum number of parts, all self-locking by rapid hand assembly. No screws, rivets or welds. The fool-proof switch will never wear out. Adaptable to any styling. Most of the parts are moulded of more available plastics. E. H. Brill, 847 Lothrop, Detroit 2, Mich.

Small company, with patented housewares-gift item, compression molded from urea or melamine, semi-automatic molds. Would like to hear from large firm who would be willing to take over the production, promotion and distribution of our product on a royalty basis. Possibility of owner being recalled to military service reason for this action. Reply Box 834, Modern Plastics.

LIQUIDATING MOLDING PLANT
4 — 210 Watson & Stillman Presses
1 — 22 Royle Extruder
3 — Watson-Stillman & Worthington hydraulic pumps
6 HP gas fired boiler
2 — Electronic pre-heaters, KW
Reply Box 839, Modern Plastics.

INVENTIONS WANTED: First-class manufacturer wants inventions using plastics and steel. We can build the molds and dies, run the production, and sell your product. Also interested in buying established businesses. Will pay royalty on existing manufacturing items that we can manufacture and sell. Write Albert E. Payne, Owner-Manager, The Payne Tool and Engr. Co., Springfield, Ohio. Strictly confidential.

FOREIGN MANUFACTURERS of plastic articles, interested in all phases of plastic production, or in new applications, or in suggestions for new and interesting plastic products, also patented products whose manufacturing rights they wish to obtain under a licensing agreement, may write for full details, also in French, German or Spanish, to Box 843, Modern Plastics.

We buy Used Fiber Drums. Highest Prices Paid. Tell us How many you have and size. Write Schaffner Mfg. Co., Inc., Emsworth, Penna.

INJECTION MOLDING PLANT
WANTED: AAAL toy manufacturer, using large quantities of molded parts, interested in purchasing molding plant outright. Will also consider "Tie-in" with established injection molder or will purchase interest in going plant. Reply Box 846, Modern Plastics.

MIS-28 PLASTIC MOLDING—Business, Equipment, and INVALUABLE PLASTIC STOCK for $48,900—with 10-year lease on Buildings totaling 4200 sq. ft. OR, purchase Real Estate, also, for additional $23,900. For details write: BENZ BUSINESS BROKERS, 208 N. Linn, Bay City, Michigan.

WILL BUY your dirty THINNERS and SOLVENTS. Send sample or letter giving approximate contents and solids. The Johann Company, Room 416, 1180 E. 63rd St., Chicago, Ill

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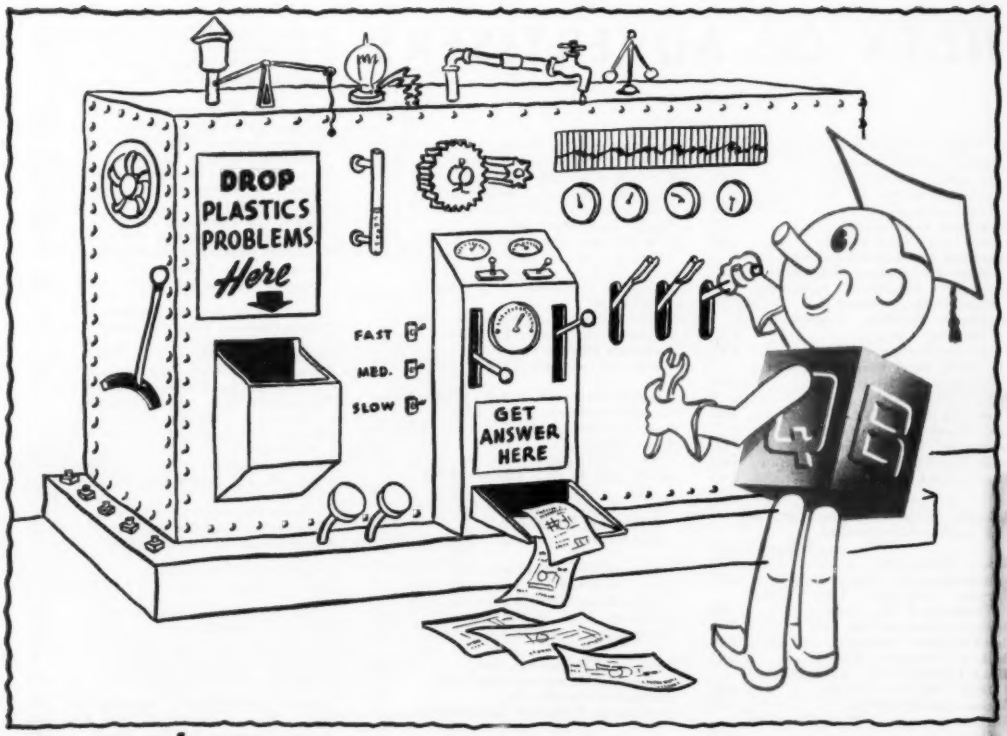
Up to 60 words (boxed) $15.00	Up to 120 words (boxed) $30.00	Up to 180 words (boxed) $45.00

For further information address Classified Advertising Department, Modern Plastics, 122 E. 42nd St., N. Y. 17, N. Y.



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GETS THE ANSWER TO YOUR PLASTICS PROBLEMS!

Nope it isn't that easy—it takes lots of planning and designing and figuring before most problems are solved. But we've enjoyed great success at satisfying our clients just the same.

We know that, in order to help you, with your problems, we must have knowledge of materials, design, die-making, production and all the rest. We have those facilities—all under one roof—you see we're specialists in molding plastics parts—from design to finished product.

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INDEX OF ADVERTISERS

FEBRUARY 1951

MODERN PLASTICS

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Give Your Product the WMP Stamp of QUALITY

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When you go to a custom injection moulder for the plastic revamping of an old product or the designing and moulding of a new one, you have every right to demand and expect quality workmanship equal to your own. Plastically speaking, the Worcester Moulded Plastics Company sets the standard of quality with Custom Mouldings of Custom Made Quality.

Our personnel, experienced in every phase of custom injection moulding, stamps your product with the trademark of WMP quality. Since we neither mould nor merchandise any product of our own, our customer is always right in line for a plastic success.

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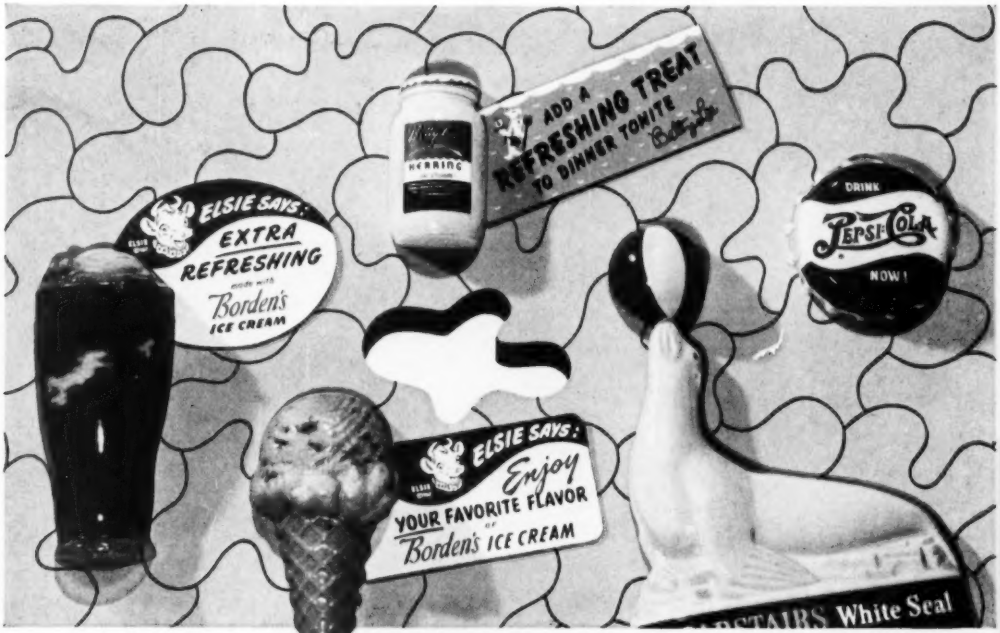

DO YOUR MATERIALS SHAPE UP TO YOUR PRODUCTS?

EASILY FORMED into colorful, decorative products, VINYLITE Plastic Rigid Sheets are exerting a tremendous influence on many a present and future product. And as fast as design engineers discover the economy and practical, useful qualities of these versatile materials, new products made of them appear.

Take these colorful, three-dimensional display pieces. They were color-printed before forming, then heated, and quickly pressed in inexpensive forms into shapes of utmost permanence.

Add to their permanence of form the properties of accurate dimensions and dimensional stability . . . and it's easy to see why VINYLITE Rigid Sheets are so widely preferred today for drafting tools, precision instruments, dials, templets. Add the qualities of chemical, oil, grease, soap, food, and moisture resistance—and you'll see why they are ideal for three-dimensional dress dummies, doll faces, multi-colored lampshades, relief maps that resist perspiration, handling, and washing. They have even made possible large-size four-color photographic transparencies at *low cost*, possessing startling new viewing characteristics.

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Signs and displays produced by Mechtronics Corporation, 325 Center Avenue, Mamaroneck, New York.

Vinylite BRAND **PLASTICS**

BAKELITE DIVISION
UCC

BAKELITE DIVISION, *Union Carbide and Carbon Corporation,* 30 East 42nd Street, New York 17, N. Y.

One of a series of messages to design engineers to show how the General Electric *specialized* plastics molding service offers important advantages to selected industries.

Specialized MOLDING SERVICE

PRODUCES RUGGED, ATTRACTIVE TV CABINETS AT LOW COST!

When a design engineer needs large, molded plastics parts, the General Electric plastics molding service offers him the most modern techniques and facilities for their low-cost mass production.

For example, G.E. turns out thousands of eye-appealing, rugged one-piece plastics cabinets for large television manufacturers. These low-cost units are just one of the parts G.E. molds for the television industry. Plastics speaker grills, cabinet fronts, record-changer bushings, dials, knobs, and escutcheons are also produced economically by G.E.

General Electric's large molding plants employ the latest and most efficient equipment . . . new injection machines capable of molding parts up to 208 ounces per shot are now being installed. Many industries consider the G-E plastics molding service an important adjunct to their own assembly lines.

Depend on General Electric plastics engineering experience and production facilities for top-quality plastics molding and extruding—at low cost. For information, write to Section B-1, Chemical Department, General Electric Co., Pittsfield, Mass.

G.E.'S SPECIALIZED MOLDING SERVICE IS GEARED TO INDUSTRIES LIKE THESE:

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